A study to investigate the use of perspective, in a short computer-based intervention, to influence self-reported nature connection, and environmental attitude

MSc Psychology (Conversion)

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Supervision Log

Date:	Discussion topics:	Action agreed:
1st Feb 2017	[Note: meetings before this date were prior to formal allocation to supervisors and were about outlining a project for the allocation process.] Since previous meeting, Tom has read around the idea of common humanity, as discussed previously.	Tom to continue trying to nail down a specific idea.
28th Feb 2017	Tom sent an outline with some on the 9th Feb. Some email back-and-forth to try to turn this into a concrete plan. Today, discussion centered on how a brief information-giving intervention might be structured in order to increase sense of connection to nature and/or sense of shared humanity.	Tom to look at ethics docs and see what support he needs. Lee to try to come up with behavioral measures of impact of the intervention [emailed later that same day].
15th Mar 2017	Discussed how to control for extraneous variables e.g. attractiveness of narrator's voice in the intervention. Plan to use same video, but with instructions to pay attention to this or that: "Press the spacebar each time the video is pointing out how much damage humans do to the planet" versus "... each time the video is pointing out how we are all part of the environment and..."	Tom to narrow down psychometric measures to most likely few, and bring along/email for next meeting (Weds). Also to choose most likely two or three videos, likewise to discuss at next meeting.

Date:	Discussion topics:	Action agreed:
22nd Mar 2017	Lengthy discussion about precisely what to measure before and after the brief intervention (measures selected, rubrics need changing). Nature of intervention discussed and decided: Prompt to focus on given aspect of video, watch video perhaps whilst tapping space bar to mark each time a certain theme comes up, then question asking for summary in own words of how the video "made you think about" the theme. Repeat with second video. Theme differs across conditions: connection to & reliance on nature versus how humans are destructive of nature.	Tom to send ethics form draft by midnight on Thursday 30th and to get in touch before if any significant barriers to progress arise.
27th Mar 2017	Finalized ethical issues and design.	Tom to send final version of ethics form for Lee to check.
12th July 2017	Discussed dissertation structure and the idea of an analysis plan. Agreed on broad outline, possible inclusion of RFT and a combination of null hypothesis analysis and relationship discovery approach in data analysis.	Tom plans to send analysis plan at the end of July.
2nd August 2017	Discussed Tom's analysis plan. All seems to make sense.	Tom to work on draft of Introduction and agree review dates with Lee.

Date:	Discussion topics:	Action agreed:
9th August 2017	Discussed structure of introduction and how to split topics between introduction and Discussion sections. Discussed how to reference different sub-sections within the introduction.	Tom to send draft of introduction (and method if possible) by end of the day Monday 14th August. Lee to provide full feedback by end of the day Saturday 19th August. Tom to suggest dates for next draft sections to be sent to Lee.
4th September 2017	Discussed various items such as depth vs breadth, number of hypotheses, structure of the discussion, statistical effect size calculations.	Carry on with draft and submit draft discussion by the 13th September for turn around by the beginning of the following week (18th Sept 2017).
19th September 2017	Went through feedback on the discussion section. Clarified the use of concepts in relation to scales, and discussing the validity of scales. Discussed the focus of the limitation section. Final comments on proof reading and checking APA style use.	Fully proof read and use spelling tools in word to identify any issues and prepare the final version for submission.

NAME: Thomas Goldstein SUPERVISOR: Lee Hulbert-Williams MODULE: Dissertation (MSc Psychology Conversion)

SUPERVISOR SIGNATURE: 

STUDENT SIGNATURE: 

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Thanks to:

- My supervisor, Lee Hulbert-Williams, particularly for his depth of knowledge, lateral thinking, encouragement and willingness to be flexible during this process
- My Parents, Barbara and Harvey Goldstein, for the sacrifices they have made and everything else done to support me on this journey

Abstract

High levels of environmental damage have been leading towards potential planetary emergency, and high levels of stress have been affecting large a percentage of the global population. Previous research focused on increasing nature connection through immersion in nature rather than computer-based urban initiatives. Very little research has looked at how perspectives can be most effectively used to increase a sense of nature connection. This study used a combination of short video clips, presented with one of two possible perspectives to participants. Forty six participants took part in the study based on opportunity sampling, from the author's personal social network and from the university psychology department. Group A were presented with the perspective of humans being separate from nature, while Group B were presented with the perspective of nature being home for humans. Questionnaires were used to measure levels of pro-environmental attitude, nature connection, environmental motives and emotional state before and after the intervention. Correlation and 2x2 ANOVAs were used to analyse the data. Perspective did not show a significant main effect. Both nature connection and pro-environmental attitude were significantly increased during the intervention (η_p^2= .12 and .38 respectively), as was negative emotional state (η_p^2= .46). Change in nature connection showed significant positive correlation to change in environmental attitude (r = .51). Increase in negative emotional state was significantly correlated with increase in nature connection (r = .37). Future research is needed to better understand the use of perspective to increase nature connection. Nature connection appears to be well linked to environmental attitude. The powerful role of negative emotions was shown, and the importance of being aware of the implications and limiting their use was highlighted. Overall, it was shown that a computer based intervention can be used into increase self-reported levels of nature connection and pro-environmental attitudes.

Introduction

Motivation for this Dissertation

Environmental disaster.

The human population is growing fast! Given the ability of humans to impact ecosystems at a global level, environmental writer Professor Emmott [CITATION Emm13 \n \t \l 2057], and others, claim that we are on a trajectory towards a planetary emergency. The stark messages presented by the UN, following the 2015 Paris climate conference [CITATION CRE15 \l 2057], demonstrate that massive change is necessary to bring humanity, and all other species, into a sustainable future, and away from a potentially disastrous environmental overshoot [CITATION Kit08 \l 2057]. The importance of protecting the environment is well understood at governmental levels, as evidenced by the high status of inter-governmental environmental work [CITATION Var17 \l 2057]. However, research in the US showed that many people denied human impact as a principle cause of climate change (Yale University, 2017; Bowman, O'Neil, & Sims, 2015), and mainstream society still focusses on profit ahead of environmental concerns [CITATION Haa13 \l 2057]. O'Neill et al. [CITATION NewChallenge \n \t \l 2057] argued that to avoid impending doom, the environment must now be viewed and discussed from the perspective of the complex life support system that it is. As discussed later in this dissertation, Frantz and Mayer [CITATION Fra14 \n \t \l 2057] found connection to nature to be a driving force behind people taking pro-environmental action. They concluded that 'Environmental education is a crucial component of confronting climate destabilization. The urgency and magnitude of the problems before us demand that we use the best tools possible' [CITATION Fra14 \p 90 \l 2057].

Wellbeing.

Aside from avoiding environmental disaster, connectedness to nature has been strongly linked with happiness and emotional wellbeing [CITATION Cer12 \l 2057]. A sense of connection to nature has been shown to significantly improve wellbeing [CITATION How11 \l 2057], increase subjective vitality [CITATION Rya10 \l 2057], create improvements in ADHD symptoms [CITATION Fra04 \l 2057], reduce stress [CITATION Tyr14 \l 2057], as well as increase positive emotions, attentional ability and the capacity to reflect on life problems [CITATION May09 \l 2057]. In one innovative study, one million responses from 20,000 participants were analysed using a smartphone app taking automated GPS coordinates and randomly timed survey questions [CITATION Hap13 \l 2057]. Results from this environmental wellbeing study showed that participants were significantly happier when outdoors, in green and natural habitats, compared to when they were in urban locations. The restorative importance of nature and the natural world on human beings has also been shown to be important, especially in the context of the highly urban environments in which most people now live, work, and play [CITATION Har91 \l 2057]**.**

In 2014, Zelenski and Nisbet conducted research to understand the unique relationship between nature connection and happiness. They also set out to establish if nature connection was a unique construct, separate from other types of human connection. Zelenski and Nisbet [CITATION Zel14 \n \t \l 2057] ran two studies comparing various measures of happiness and wellbeing. By controlling for broad subjective connection, using partial correlation, results from both studies showed that the relationship between nature connection and happiness stayed

significant for most, although not all, measures of happiness. In the first study, which used a short version of the nature connection measurement instrument, the strength of correlation, between nature connection and wellbeing, was greatly reduced after controlling for broad subjective connection. This reduction was not seen in the second study, which used the full version of the nature connection measurement instrument (21 items rather than the short 6 item version). Zelenski and Nisbet [CITATION Zel14 \n \t \l 2057] found that correlation between nature connection and several of the happiness measures stayed significant at the .001 level, showing a small to medium effect size. Their results suggested that connection to nature was a unique construct, which had a unique and significant relationship with happiness.

Existing research.

Connection to nature has become an area of interest for academic study, by 2015 there were approximately 90 studies relating to this area of research [CITATION Res15 \l 2057]. However, this pales into insignificance when compared to the 15,000 research articles reported by Google Scholar in relation to a keyword search on Facebook in 2017. At the time of writing this dissertation, nature connection still remained a poorly defined and poorly understood concept. Much of the discussion of nature connection has bridged the somewhat related disciplines of psychology and philosophy [CITATION Ric13 \l 2057]. As discussed in this dissertation, most researchers have used a combination of affective and cognitive elements to define human connection with nature. As an example, Figure 1 shows a reproduction of how the Royal Society for the Protection of Birds defined nature connection in their 2013 report focusing on how children across the UK connected with nature [CITATION Roy13 \l 2057]. This was based on previous research by Cheng and Monroe [CITATION Che121 \n \t \l 2057], and captures the essence of nature connection in the authors' opinion. However, in 2015, Richardson

and Sheffield noted that nature connection was a complex concept which still needed further investigation.

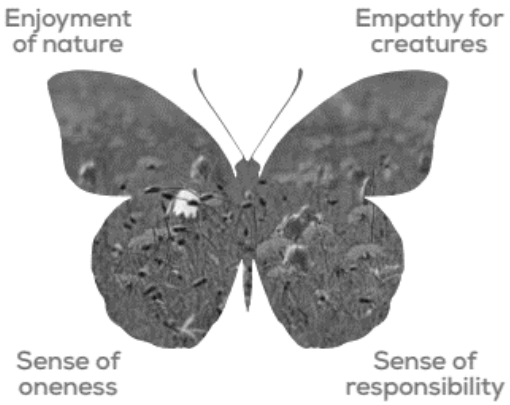

Figure 1 - A definition of nature connection, reproduced from RSPB report (2013, p.4), based on Cheng and Monroe (2012)

Influencing nature connection and environmental attitude.

Metzner [CITATION Met95 \n \t \l 2057], argued that human connection to nature was fundamentally being lost, a position that has been supported by others such as Louv [CITATION Ric13 \n \t \l 2057] and Pontin [CITATION Cli93 \n \t \l 2057]. Hudson and Roberts [CITATION Hud14 \n \t \l 2057] found that despite an intention to change, people tend to avoid the day to day behaviours necessary to create changes in their lives. This suggests that it is ethically acceptable to use interventions to help people change. Specifically to increase their sense of connection to nature, given all the benefits mentioned above. Motivated by the available research, this dissertation aims to add to the current understanding of nature connection is, how it may be influenced and how it relates to environmental attitude. Since most people now live in towns and cities, perhaps with little access to nature, it was decided to focus on an approach that could be easily administered in an urban environment. The rest of this introduction draws on the available research to understand what mechanisms are at play in both nature connection and environmental attitude, and how these might be influenced through a computer-based

intervention. For the purpose of this dissertation, the terms ‘connection to nature’ and ‘nature connection’ are generally used interchangeably.

Self and Connection to Other

By understanding how to conceptualise self, we can start to understand how people can be influenced in terms of their relationship, beliefs and behaviours relating to the natural world, and connection to nature. Carl Rogers defined the self as ‘an organised set of perceptions possessed by the individual, who is ultimately responsible for their own actions’ [CITATION Dan14 \p 172 \l 2057]. Richardson and Sheffield [CITATION Ric15 \n \t \l 2057] suggested that connection to nature was deeply related to the concept of self. Schultz [CITATION Emp00 \n \t \l 2057] made it clear that connection to nature fundamentally relies on how individuals integrate, or don’t integrate, nature into their sense of self.

Self-concept.

Gecas [CITATION Gec82 \n \t \l 2057] identified the difference between self and self-concept, defining self as the internal process whose outcome is self-concept. Considering oneself as separate from others comes easily, given that we have the physical boundary of our skin and the hardwiring of our internal nervous systems. Our main senses, eyes, ears and touch, face outwards from our physical bodies and take in the world around us, making it easy to operate from a perspective of separation. However, the need for humans to belong and connect to other(s) is strong and fundamental to our existence [CITATION Bau95 \l 2057]. Connection can be thought of as a relationship, an overlap between one entity and another [CITATION Aro92 \t \l 2057]. The degree of overlap that one creates with another, in other words, the degree to which one includes another as part of their self, is what dictates the closeness of a relationship (Aron, Aron, Tudor, & Nelson, 1991).

Self-schemas.

Self-schemas may help explain the process of organising, summarising and explaining one's own behaviour. Markus [CITATION Mar77 \n \t \l 2057] suggested that self-schemas explain the cognitive structure from which self-concept emerges. More recent sub-divisions of self, focus on the constructs of core (or minimal) self and narrative (or autobiographical) self (Damasio, 2012; McHugh & Stewart, 2012). It is the construct of narrative-self that is most easily interacted with, using language, to influence beliefs and behaviours. Since self-schemas are definable using human language, and describe beliefs that people hold about themselves, their relationships, and about the world around them, self-schemas can be identified and modified using everyday language [CITATION Pad94 \l 2057]. An example, based on the examples given by Padesky, would be shifting someone's perspective from 'Nature is where wild animals and creepy crawlies live' to 'I feel at home in nature'. Self-schemas can therefore play an important role in influencing a person's relationship with nature.

Empathy.

Empathy is considered by many to be the mechanism that allows humans to feel the pain of others, almost as though it were their own [CITATION Håk03 \l 2057]. Rogers defined empathy as the ability '…to sense the client's private world as if it were your own, but without ever losing the 'as if' quality.' [CITATION Rog07 \p 243 \n \t \l 2057]. Empathy research has traditionally been split into two elements: cognitive, in which feelings can be *recognised* by another person; and affective, in which feelings can be *felt* by another person [CITATION Meh72 \l 2057].

Perspective taking.

Perspective taking is an important aspect of the cognitive element, since it generally involves a process of imagination to understand the other person's thoughts, feelings or experience (Batson, Batson, et al., 1995). The ability to take perspectives in order to put oneself in another's shoes, creates an overlap between self and other, and has been shown to reduce negative bias towards others, and to improve social bonds (Davis M. H., 1996; Galinsky, Ku, & Wang, 2005; Galinsky & Moskowitz, 2000; McHugh, 2015; Vescio, Sechrist, & Paolucci, 2003). Once a cognitive understanding of the other's perspective exists, it stands to reason that emotional empathy can emerge. This has been shown in the research, although the mechanisms involved are complex and difficult to identify [CITATION Eis14 \l 2057].

Relational Frame Theory (RFT) provides a way of looking at the interaction of self and language in a similar way to schemas, but focus specifically on the relational aspects of language, and how that shapes human perceptions and understanding [CITATION McH12 \t \l 2057]. Relation Frame Theory (RFT) highlights the importance of internal language and perspective taking in defining self and the position of an individual in relation to the world around them [CITATION Der01 \l 2057]. McHugh [CITATION McH15 \n \t \l 2057] linked Contextual Behavioural Science, RFT and the concept of self, showing how important perspective taking is to self-concept, and how a functional understanding of self is key to understanding the development of self-concept. Relational Frame Theory (RFT) also provides a way to conceptualise perspective and empathy [CITATION Vil09 \l 2057]. The RFT approach makes use of dietic framing in which humans can distinguish between the perspectives of I / You. Since this ability to occupy perspectives is a key aspect of understanding language, it comes naturally to humans and allows us to step into the shoes of another person [CITATION Vil09 \l

2057]. This same process would appear to be possible between humans and nature, simply by applying the same dietic framing process. As discussed above, once we are able to take on someone or something else's perspective as if it is our own, we can experience feelings based on our own experiences of the aspects of their situation that we have taken on.

Connection to Nature

As humans, when we experience physical pain, we are experiencing feedback from our own sensory nervous systems. When people exhibit symptoms of experiencing the pain of the natural world, there is a lack of the physical connection provided by the human nervous system. Touch, smell, sight and hearing are providing the interfaces to nature. Although this is an indirect connection, it appears to be able to create cognitive and affective processes and responses much in the same way as when a person experiences their own physical pain. This section discusses how the extant research tries to define and explain this sense of connection to nature.

Biophilia theory.

It has long been debated whether humans are fundamentally part of the natural world, or if we have now become separate and perhaps even superior to nature [CITATION Ric13 \l 2057]. In his theory of Biophilia, published in 1984, Wilson developed the existing concept of human affinity for life and life like processes, emphasising that humans have evolved in an almost entirely nature based world. Wilson argued that this evolutionary context created an innate human affiliation towards nature and life in the natural world [CITATION Krč09 \l 2057]. The Biophilia theory suggests that to avoid a connection with nature is to deny our basic human nature.

Research on public opinion in the US showed that there was a strong sense of biophilia towards the natural world, where '70–90% of the population recognize the right of nature to exist

even if not useful to humans in any way' [CITATION Riy01 \p 65 \l 2057]. Van den Born et al. carried out their own study in the Netherlands, based on a mixed quantitative / qualitative methodology. From the quantitative results, they found that 72% of the 200 participants believed that humans were part of nature and should therefore share responsibility for looking after it, with 65% believing nature was important for future generations and 40% believing nature was intrinsically important in itself. As part of the study, eight qualitative interviews were carried out, where participants' childhood experiences of nature were explored.

The findings [CITATION Riy01 \l 2057] showed that, firstly, there appeared to be two distinct types of childhood interactions with nature: direct interactions with nature itself, such as closely observing a baby bird, or experiencing getting stuck in a bog; and secondary experiences such as picnics or games outside in nature. Secondly, there were clear differences in how connected the participants felt, depending on whether they had grown up in rural or urban settings. More childhood exposure to nature led to a stronger level of what the researchers termed *naturalness*. Thirdly, women in the study were found to have a stronger sense of 'naturalness' compared to men. This could have been due to a confounding factor where the women identified with certain language formulations more than the men, a possibility that was supported by O'Neil's [CITATION ONe81 \n \t \l 2057] research on gender, language and sexism. Fourthly, many participants highlighted the importance of place in their experience of nature, with a preference for one of three types of spaces identified as: small secret spaces; small shared places; and open shared spaces. The importance of place is discussed later in this dissertation, although it is outside the scope of a short computer-based intervention.

Finally, an important finding from Van den Born et al.'s [CITATION Riy01 \n \t \l 2057] study was that there was a wide variation across participants in terms of what interactions

with nature meant to them, and the language they used to describe nature. This lack of common definition may be expected to some extent due to individual differences. However, the availability of common language to describe nature, connection to nature and nature based experiences is important if the topic is to be more widely addressed. This same conclusion was identified by researchers such as Martin [CITATION Mar04 \n \t \l 2057], who found that having relevant language, to describe interaction with nature, was vital to free and full discussion of connection to nature.

Developmental psychology.

One approach to understanding connection to nature comes from the developmental psychology theory of attachment [CITATION Jor09 \l 2057]. Jordan theorised that early relationships with the natural world shape later relationships with nature, in much the same way that childhood warm, anxious or avoidant attachment styles with parents shape interpersonal connections and relationships in later life. Other research also supports this theory, showing that childhood exposure to wild nature has a significant positive relationship with positive attitudes towards the natural environment in adulthood [CITATION Wel06 \l 2057]. Ewert, Place and Sibthrop's [CITATION Ewe05 \n \t \l 2057] research into early life experiences identified childhood values, social influences, experience of natural places and experience of loss of natural places to which the child has a strong emotional connection. Ewert, Place and Sibthrop found that these go on to influence beliefs, values and behaviours in adult life. Cheng & Monroe [CITATION Che121 \n \t \l 2057] identified family values toward nature, previous experience in nature and knowledge of the environment as having the strongest and most significant relationship with connection to nature for children. They also found that children's strength of connection to nature influenced their desire to participate in nature based activities in the future.

In their study on barefoot walking in nature, Harvey, Oskins, McCarter and Baker [CITATION Osk16 \n \t \l 2057] found that age was significantly and positively related to connection to nature. This runs counter to most other research, as noted by Van den Born, Lenders, De Groot, & Huijsman [CITATION Riy01 \n \t \l 2057]. One possible explanation for nature connection getting stronger with age came from Ball et al. [CITATION Bal17 \n \t \l 2057], who noted that empathy develops in line with a cognitive understanding of the differentiation between self and other. Based on these findings, the ability to empathise, and therefore connect with nature should increase with cognitive development. However, this process is likely to be limited to early year's development, since cognitive ability increases most in this period of human development.

It is possible that children who grow up in an urban environment have their natural nature connection stunted during their cognitive development. In his literature review and own qualitative studies, Kahn [CITATION Kah97 \n \t \l 2057] found that children's negative experiences of nature, or a lack of childhood nature experiences, negatively affect their likelihood of connecting with nature in their adult life. However, it seems likely that children who grew up in urban environments will be able to form strong connection to nature when they are older, especially if they did not have strong negative experiences with nature as children. Childhood experiences of nature are clearly very important to nature connection and to environmental attitudes, and as such it is something that should be addressed as part of the wider topic of nature connection. The limited scope of this current study means immersive and childhood experiences were not directly relevant to building an adult focused intervention. However, it was important to consider the individual differences of nature connection, and to

measure strength of nature connection both before and after any intervention in order to understand the increase in nature connection rather than the absolute measure.

Overlap with nature.

As discussed earlier, connection to nature can be seen as a form of relationship, analogous to other forms of human relationship. As such, overlap between self and nature is an important aspect to consider. Schultz [CITATION Sch02 \n \t \l 2057] devised the Inclusion of Nature in Self (INS) scale (see Figure 2) which depicted this overlap of self and nature. Schultz wanted to measure how people merge their personal boundaries with those of the natural world. However, it is unclear what mechanisms are actually being measured by this approach. Depending on the person completing the INS scale, the results may show a cognitive connection with nature, an emotional one, or simply the amount of time they spend in nature. Despite this validity issue, Schultz [CITATION Sch02 \n \t \l 2057] reported good reliability over time, and good correlation with other scales that measure nature connection and environmental centric attitudes. Schultz made no attempt to discern what is really being measured in his INS scale, so an assessment of validity was not possible (see the section below on *Measuring the effects.*). Even though this scale was not used in this dissertation study, the concept of overlap appeared to be fundamental to the concept of nature connection.

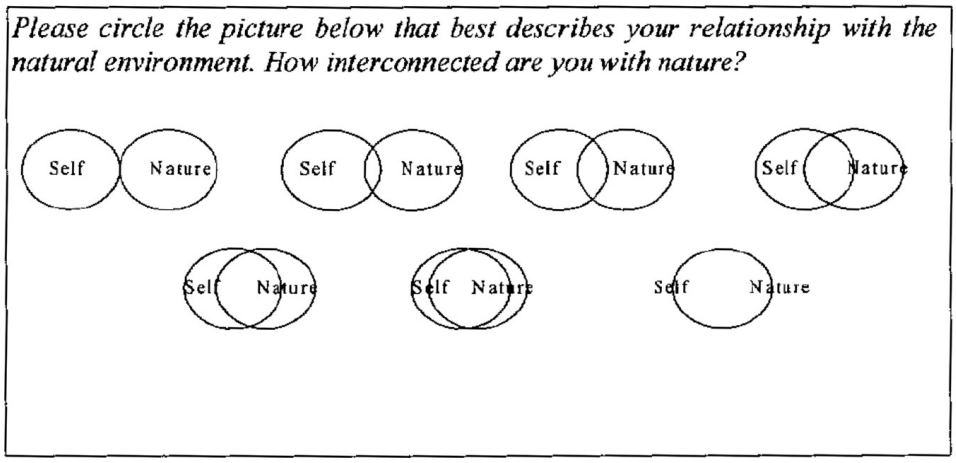

Figure 2 – Inclusion of Nature in Self (INS) scale, reproduced from Schultz, 2002, P.72

Empathy with nature.

Tam [CITATION Tam13c \n \t \l 2057] identified the potential for building a theory of connection to nature based on empathy. He ran a series of five studies to investigate the relationship between dispositional (trait) empathy, environmental attitudes and connection to nature, in both Hong Kong Chinese and US Caucasian communities. The results showed that trait empathy, predicted both pro-environmental attitudes and connection to nature. Dutcher, Finley, Luloff, & Johnson [CITATION Dut07 \n \t \l 2057] developed the notion that a degree of sameness was necessary for empathy to emerge. This sense of sameness was described by Håkansson and Montgomery [CITATION Håk03 \n \t \l 2057] as the requirement for a similarity between what the target is experiencing and what the empathiser has experienced before. In other words, the empathiser must have some understanding of the suffering experienced by the target. While this mechanism can be easily understood when talking about empathy for other humans or perhaps even animals, the idea that humans can understand the pain experienced by a tree or river is much less intuitive. There appear to be three plausible explanations for how someone can experience the pain or suffering in nature: they may be

anthropomorphising the natural world, as discussed below; they may be experiencing something analogous to suffering in nature, such as loss or isolation, which they have previously experienced themselves; they may be considering the wider consequences of the suffering in nature, such as the impact on one's own happiness as local nature areas are replaced by housing estates. This final suggestion is addressed by Schultz [CITATION Emp00 \n \t \l 2057] in his investigation into motivations for environmental concern. The outcome from his research was a measurement scale to measure the degree of egotistic, altruistic or biospheric concern that motivates an individual to protect the environment. This measure was used in the dissertation study to help understand the relationship between personal motivations, connection to nature and environmental attitude.

Emotional affinity to nature.

A great deal of environmental education has focussed on ecological knowledge rather than ecological experience [CITATION Hun90 \l 2057], however, Lumber, Richardson and Sheffield [CITATION Lum17 \n \t \l 2057] found that ecological knowledge was not a significant predictor of connection to nature. The importance of understanding affective connection was highlighted by Iozzi [CITATION Ioz89 \n \t \l 2057], who noted that there were already a surprising number of affective elements in outdoor education, and that this focus was important to create effective and long lasting pro-environmental attitudes. Lumber, Richardson and Sheffield [CITATION Lum17 \n \t \l 2057] identified the pathways of emotions, compassion, and beauty, as significant predictors of connection to nature. These pathways are likely to be affective rather than cognitive mechanisms, and therefore relate directly to human emotions. Kals, Schumacher and Montada [CITATION Kal99 \n \t \l 2057] discussed emotional affinity towards nature, and its place amongst the other theories. They concluded that

affinity for nature plays a real and powerful part in people's relationship to nature, and that it should hold a more important place within models of human behaviour towards the environment. Hinds and Sparks [CITATION Hin08 \n \t \l 2057], found that affective connection to nature was a significant predictor of pro-environmental behaviour and that those who had grown up in rural environments showed more positive intentions towards engaging with nature.

The Connection to Nature scale (CNS) developed by Mayer and Frantz [CITATION May04 \n \t \l 2057], was designed to measure affective connection to nature. Their aim was to replace previous scales that had been found by Mayer and Frantz to measure more cognitive aspects of connection rather than affect. The debate about affective connection to nature versus cognitive connection to nature led Perkins [CITATION Per10 \n \t \l 2057] to develop a scale focused entirely on the affective qualities of love and care for nature (LCN). Perkins noted that perhaps even CNS [CITATION May04 \t \l 2057] was more biased towards cognitive than affective connection. However, as Iozzi [CITATION Ioz89 \n \t \l 2057] pointed out, it's very difficult to split apart cognitive and affective aspects of being human, as one will always invoke the other. As discussed in relation to INS [CITATION Sch02 \t \l 2057], it seems difficult to test the validity of a scale that claims to measure affect more than that of another scale. Perkins [CITATION Per10 \n \t \l 2057] attempted to do this using regression analysis to measure the ability of three scales (LCN, CNS and INS) to predict a willingness to sacrifice for the environment. Perkins [CITATION Per10 \n \t \l 2057] relied on philosophical theory, that personal sacrifice required a deep affective and value based connection, as the reason for the sacrifice. Perkins' results showed that her new LCN scale did have higher correlation with two measures of willingness to sacrifice to protect the environment. Mean correlation of 0.59 for LCN compared to 0.49 and 0.38 respectively for CNS and INS, all three were significantly

related to willingness to sacrifice to protect the environment at a significance level $p < .001$. However, Perkins appears to have made a mistake in reporting that LCN was the only significant predictor of willingness to sacrifice in her multiple regression testing. The results showed a mean β of 0.45 for LCN compared to 0.06 and 0.09 respectively for CNS and INS, with only LCN being a unique significant predictor. While Perkins [CITATION Per10 \p 461 \n \t \l 2057] states that all three 'predictors were entered into the analysis simultaneously', her results actually appeared to show that, *in the presence of LCN*, CNS and INS were no longer unique predictors, which is something entirely different. In other words, since LCN, CNS and INS were expected to be related to each other, as measures of connection to nature, they would not all be unique significant predictors within the same multiple regression model, see [CITATION Bra12 \p 270 \l 2057]. In fact the significance levels of all three predictors was quite similar. Further, it makes intuitive sense that CNS would be a significant predictor of willingness to sacrifice, given the evidence provided both in the paper describing the design of the CNS measure, and further papers using CNS to measure connection to nature e.g. [CITATION May04 \l 2057]. The CNS measure is discussed elsewhere in this dissertation, and was selected as the measure of nature connection for this study. By selecting this measure, CNS therefore becomes the ultimate definition of nature connection as far as this dissertation is concerned.

Affective pathways to nature connection.

One study, mentioned above, looked at participants' preference for going barefoot in a town in North Carolina, USA [CITATION Osk16 \l 2057]. Harvey, Oskins, McCarter and Baker found that there was a significant relationship between comfort in going barefoot and connection to nature. Although their study suggests that a connection to the earth through barefoot walking and running is important, their regression analysis showed barefoot preferences to predict

between only 5% and 10% of connection to nature, and causality was not studied. Given the general lack of people going barefoot outside the home, the fact that nearly 23% of the 209 participants regularly went barefoot in nature seems surprising. It's certainly possible that a strong sense of connection to nature was what drove these people to walk or run barefoot rather than the other way around. However, the authors of the study [CITATION Osk16 \l 2057] do cite good evidence to suggest that walking barefoot in nature should increase mindful attention and perhaps reflective self-attention to the natural surroundings, which have been shown to be factors in nature connection by Richardson and Sheffield [CITATION Ric15 \n \t \l 2057]. Sixty two percent of the participants in Harvey, Oskins, McCarter and Baker's barefoot study reported experiencing positive emotions of feeling free while walking barefoot in a natural environment, with 59% reporting feeling connected, and 55% being happy when walking barefoot in nature. As this dissertation study was computer based, immersion in nature was not used. However, the findings that emotions were related to nature connection were relevant. Capaldi, Dopko and Zelenski [CITATION Cap14 \n \t \l 2057] ran a meta-analysis of studies that linked connection to nature with wellbeing. Across 30 studies and 8,523 participants they found that nature connection and positive affect were positively related, with a small effect Pearson's correlation of r = .22. Several scales, including CNS, were used to measure connection to nature. Positive and negative emotional state were therefore taken into account as part of this dissertation study.

Other forms of connection to nature.

Although not directly relevant to this dissertation study, this sub-section explores some of the other forms of connection to nature that are important to consider in the context of the wider topic.

Felonneau [CITATION Fel04 \p 45 \n \t \l 2057] coined a term ‘topological identity’ to highlight the importance of attachment to place for humans. Although connection to a natural place is not the same as connection to nature, the use of natural places, where people can become immersed in, comfortable with and engaged with nature, are a good starting point for bringing people into connection with nature [CITATION Mar04 \l 2057]. With repeated exposure to a natural place, connection is built along with a level of comfort and understanding within that environment [CITATION Mar04 \l 2057]. It has been found that time spent in a specific place builds an understanding that enables people to operate effectively and efficiently within the environment associated with that place [CITATION Woo00 \l 2057]. In the case of rural places, filled with nature and natural processes, a connection to these natural elements is likely to create an understanding and appreciation for the complexities and interdependencies abundant in the natural world.

In exploring the spiritual side of connection to nature, Davis [CITATION Dav111 \n \t \l 2057] provided a comprehensive overview of the intersection of eco-psychology and transpersonal psychology. This combines the concepts of spirituality, self-transcendence (non-duality often associated with Buddhism), nature-based poetry, shamanism and ancient cultures such as the Lakota peoples of North America or Aboriginal peoples of Australia. While many people in the West would not consider themselves to have such a deep spiritual connection to nature, Wuthnow [CITATION Wut78 \n \t \l 2057] found that 82% of his 1,000 strong sample, found the pure beauty of nature to be deeply moving, with 49% feeling beautiful nature experiences had a lasting effect on them. Wuthnow’s qualitative study was focused on peak experiences of bay area residents in Northern California, US, and was based on the hypothesis from Maslow [CITATION Mas62 \n \t \l 2057] that humans naturally aspire towards self-

actualisation. According to Brown [CITATION Bro89 \n \t \l 2057], one of the main reasons that people reported seeking wilderness experiences was related to some form of transpersonal (or spiritual) experience, these findings were supported in separate research by Beck [CITATION Bec88 \n \t \l 2057], and Kaplan and Talbot [CITATION Kap83 \l 2057]. Davis [CITATION Dav111 \n \t \l 2057] pointed towards a sense of connection between self and nature with an almost complete blurring of the boundaries, leading to an almost complete overlap between self and nature. He discussed self-transcendence as the experience of self, which is expansive beyond the typical boundaries of self in comparison to the other. This suggests a unity with others and a connection with the natural world, and even the wider universe, where the entire system is an expression of a single being and existence

Pro-Environmental Behaviour

For the purpose of this dissertation, pro-environmental behaviour will be taken to mean 'behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production)', as proposed by Kollmuss and Agyeman [CITATION Kol02 \p 240 \n \t \l 2057]. Pro-environmental behaviour can be difficult to predict, and often results from a complex mixture of cognitive and emotional aspects of an individual's beliefs, values, abilities, and the context within which the behaviour will be displayed, such as the relative wealth of the individual (Han & Hyun, 2016; Kollmuss & Agyeman, 2002).

Connection to nature.

Several researchers have directly investigated the relationship between connection to nature and pro-environmental behaviour (Frantz & Mayer, 2013; Richardson & Sheffield, 2017; Schultz, 2000). Frantz and Mayer [CITATION Fra14 \n \t \l 2057] concluded that a sense of

connection with nature was a driving force, motivating people to take pro-environmental action. Geng, Xu, Ye, Zhou, & Zhou [CITATION Gen15 \n \t \l 2057] found that implicit connection with nature showed a positive correlation with spontaneous pro-environmental behaviours while explicit nature connection was positively correlated with deliberate pro-environmental behaviours. Green and Reed [CITATION Dav09 \n \t \l 2057] found that inclusion of nature in self (INS scale mention above) predicted higher levels of pro-environmental behaviour. However, counter to the belief that connection to nature automatically leads to pro-environmental behaviour, Beery and Wolf-Watz [CITATION Bee14 \n \t \l 2057] found only a weak correlation between the two, in their analysis of secondary data from 4,700 participants in a national Swedish survey. Their study will be discussed later in this section regarding connection to place.

The degree to which people consider themselves part of nature has repeatedly been found to be positively correlated with their level of environmental concern (Dutcher, Finley, Luloff, & Johnson, 2007; Geng, Xu, Ye, Zhou, & Zhou, 2015; Nisbet, Zelenski, & Murphy, 2009; Schultz, Shriver, Tabanico, & Khazian, 2004; Steg, Lindenberg, & Keizer, 2015). This appears to be analogous to inter-human relationships where it has been shown that a willingness to help increases as the closeness of relationship increases (Cialdini, S., Lewis, Luce, & & Neuberg, 1997; Coke, Batson, & McDavis, 1978). Cheng and Monroe [CITATION Che121 \n \t \l 2057] studied data from 5,500 fourth grade (nine to ten-year-old) children in the US. Using a multiple regression path analysis on the results from a 16-item scale that they constructed themselves (Cronbach's $\alpha = 0.87$), Cheng and Monroe found that connection to nature ($r = 0.30$, $p < .05$), previous experience in nature ($r = 0.11$, $p < .05$), perceived family value toward nature ($r = 0.30$,

$p < .05$), and perceived control ($r = 0.28$, $p < .05$) were the most important predictors of pro-environmental attitudes.

A link between connection to nature and pro-environmental behaviour was also demonstrated by Frantz and Mayer [CITATION Fra14 \l 2057]. Following a previous study, their lab showed that over three years, a higher connection to nature score, reported using CNS instrument [CITATION May04 \l 2057], and showed a significant negative relationship to the amount of electricity used by individuals within a sample of 2141 students. This was followed up by a second study which showed that an increase in connection to nature, following real-time feedback about electricity usage, predicted a reduction in electricity usage. Franz and Mayer concluded that a sense of connection with nature was a driving force, motivating people to act, and that connection with nature was an important aspect to promote in any outdoor or environmental education programme. However, it is unclear whether connection to nature was what drove the variations in electricity usage. It is quite possible that the simple awareness of environmental issues and the various costs of electricity were stronger influences on usage patterns. It is also unclear what the internal motivations were for the participants, and this should have been assessed as part of their study using the environmental motivations scale (Schultz, 2000) discussed earlier, and as used in this dissertation study. As Frantz & Mayer [CITATION Fra14 \p 514 \n \t \l 2057] concluded, '…future research needs to elaborate on whether simply feeling a sense of connectedness to nature in itself leads to eco-friendly acts, or whether feeling connected to nature establishes the necessary condition that makes a request for eco-friendly acts more effective'.

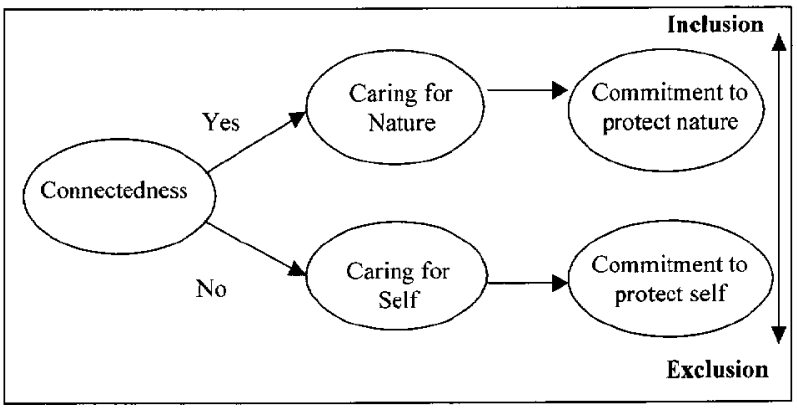

Figure 3 - A relationship between connection to nature and pro-environmental behaviour, reproduced from Schultz 2002, P.69

Environmental knowledge.

As discussed earlier, a great deal of environmental education is focussed on increasing knowledge and understanding of natural environments. However, evidence suggests that the relationship between ecological knowledge and pro-environmental attitudes and actions is weak at best [CITATION Hun90 \l 2057]. In one study which attempted to support an educational approach to developing environmental knowledge, Bradley, Waliczek, & Zajicek [CITATION Bra99 \n \t \l 2057] measured the impact of a short environmental science course, consisting ten 50-minute lessons, on high school students' environmental attitudes. Using paired sample t-tests on environmental knowledge tests and an environmental attitude survey before and after the course, the researchers' data showed that environmental knowledge had significantly increased, by 22%, while environmental attitudes had become significantly more favourable, but only by 2%. Their conclusion, that an increase in environmental knowledge caused an increase in pro-environmental attitudes, was based mainly on correlation of pre, and post course scores, and did not examine any potential confounding factors such as exposure to pro-environmental attitudes during the course. These shortcomings mean that their results do not provide evidence of a strong relationship between environmental knowledge and pro-environmental attitudes. Hungerford

[CITATION Hun90 \n \t \l 2057] highlighted the misguided nature of environmental education, and identified a set of major and minor variables that drive environmental behaviours (see Figure 4). Knowledge of ecology only featured as a minor variable, and only at one stage in the model. Much more important was a knowledge of the issues relating to the environment, personal investment in the environment and the issues and a belief in one's ability to take effective action regarding the issues. It is not that knowledge and awareness are not important. The point is that knowledge of the environment itself is not enough. A knowledge of the issues facing the environment and an understanding of how the environmental systems work is much more important when predicting and influencing environmental behaviours.

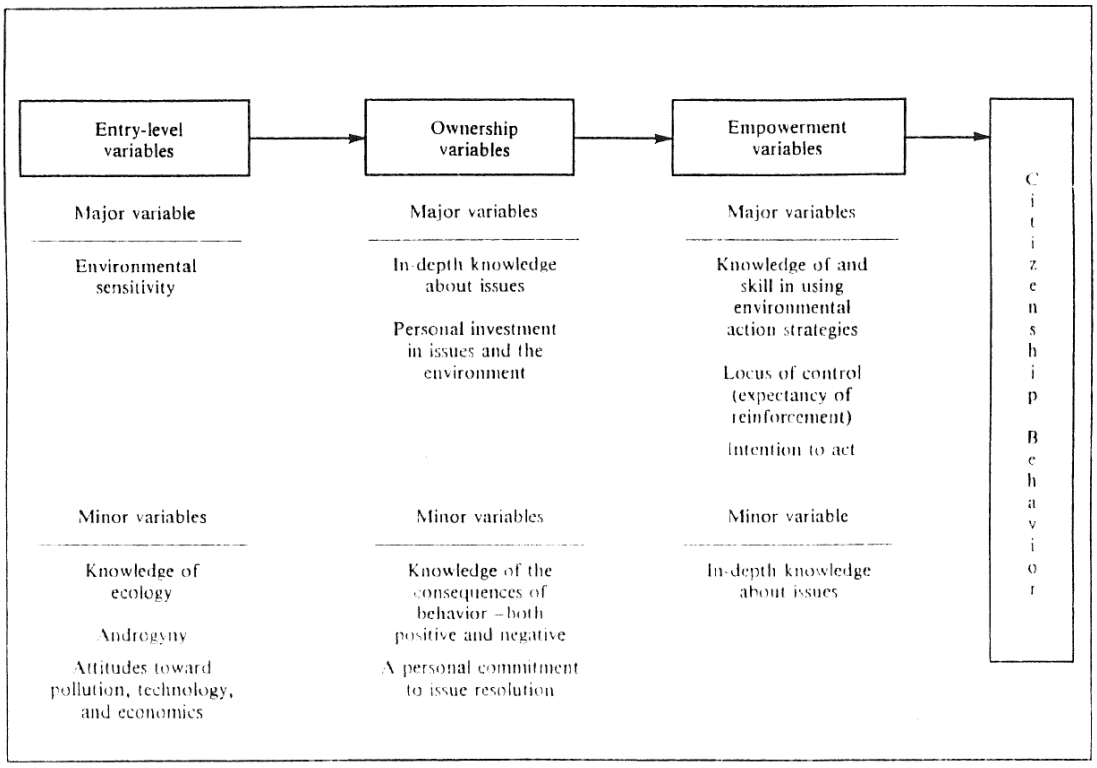

Figure 4 - Major and minor variables affecting pro-environmental behaviours, reproduced from Hungerford, 1990, p.260

Motivation, approval and efficacy.

While Hungerford [CITATION Hun90 \n \t \l 2057] found that knowledge of environmental issues was a major driver of pro-environmental behaviour, Marshell [CITATION Geo14 \n \t \l 2057], a leading international advisor on environmental communication, argued that it is not a lack of information or expertise that are the biggest issues relating to environmental behaviours. Marshell focussed more on the reasons why people would, or would not act, even in the presence of knowledge and information. Referring to the Theory of Planned Behaviour, Hinds and Sparks [CITATION Hin08 \n \t \l 2057] identified an important moderator of pro-environmental behaviour: the combination of motivation to act, social approval for the action and perceived successful outcome of the action. Self-efficacy, or the belief in one's ability to be successful in one's actions was also raised as an important driver of pro-environmental behaviour by Han and Hyun [CITATION Han16 \n \t \l 2057]. This relates well to locus of control as identified by Hungerford [CITATION Hun90 \n \t \l 2057] (see Figure 4).

The need for people to align their beliefs with an ability to act in accordance with those beliefs has been shown to be a strong motivator for environmental action in general [CITATION FRA99 \l 2057]. This was highlighted by Kirby [CITATION Red03 \n \t \l 2057] who discussed cognitive dissonance for people with strong environmental beliefs as a key driver for moving to environmentally focused eco-villages. Sheldon, Wineland and Venhoeven [CITATION She16 \n \t \l 2057] compared various factors such as intrinsic motivation, personal values, building knowledge, personal growth, career progression, and building social bonds to understand what drives pro-environmental behaviour. To do this they used a combination of Self-Determination Theory and Functional Motives Theory. Their findings, along with those of Pelletier, Green-Demers, Tuson, Noels and Beaton [CITATION Pel98 \n \t \l 2057],

demonstrated that the intrinsic motivation, as identified in Self-Determination Theory, was the primary predictor of commitment to pro-environmental behaviours.

Olivos and Clayton [CITATION Oli17 \n \t \l 2057] argued that issues which were more personally relevant would evoke stronger and more empathetic responses. Further, these kinds of responses were often observed when there was a perception of shared identity with nature. The implication, as Olivos and Clayton pointed out, was that a sense of connection to nature would increase the sense of sameness and shared identity with nature and therefore create stronger responses towards pro-environmental behaviours. The sense of shared identity was used in this dissertation study through the perspective of *nature as home*. This perspective was compared and contrasted with one of humans being *separate from nature*. The context of the damage being done to nature was then applied to both perspectives to understand the effect of perspective on a sense of connection to nature.

Influencing Connection to Nature

This section describes four studies that have been performed with a specific focus on manipulating connection to nature, often in association with factors that relate to pro-environmental behaviour. These studies provide the basis for the design of the intervention for the dissertation study.

Study 1: Richardson and Sheffield (2015).

Richardson and Sheffield investigated three lab-based approaches to increasing nature connection, by comparing reflective self-attention with mindful attention and the big-5 personality traits. Using a combination of correlation and hierarchical multiple regression, Richardson and Sheffield [CITATION Ric15 \n \t \l 2057] investigated the change in predictive power of a model they were developing as they added the independent variables listed above.

Their first study used R2 and change in R2 to show that mindful self-attention accounted for 12% of the variance in CNS, while adding mindful self-reflection and rumination (anxious self-attention) accounted for another 9% and 2% respectively. All three predictors were uniquely significant at the $p < .001$ level. The β values from study 1 showed that self-reflection was a more important coefficient than self-attention and rumination. Based on previous research [CITATION How11 \l 2057], Richardson and Sheffield entered mindful self-attention first, which missed the opportunity to test a model based on the strongest correlated predictor. Their second study added the big five personality traits to the multiple regression analysis. Their results showed that self-reflection and openness were the strongest significant predicators of nature connection, which was as expected from previous research (Nisbet, Zelenski, & Murphy, 2009; Tam, 2013). Richardson and Sheffield also describe mindful self-attention and rumination as important parts of the model predicting NC, based on a significant overall increase in overall predictive power, even though these were not significant unique predictors. This was a potentially misleading conclusion, since the simple process of adding more predictor variables to a multiple regression can increase the predictive power of the model. In their third study, Richardson and Sheffield [CITATION Ric15 \n \t \l 2057] investigated the potential to increase nature connection through participants' viewing of photos showing typical UK countryside scenes such as green and rolling hills. Their results showed that connection to nature was increased during the study by around 10%. They also found that mindful self-reflection (as opposed to anxious self-reflection / rumination) was significantly related to the increase in connection to nature, but this time mindful self-attention (pre-reflective attention) was not. Their third study was more relevant to this dissertation than the first two, since it focused on a live intervention and directly on Connection to Nature rather than other measures such as personality

traits. However, they provided less raw data for their third study compared to their other two studies. It is therefore unclear how they built their multiple regression model in this third study, while their discussion is quite limited. Across the three studies, it was unclear whether R2 or adjusted R2 was used to analyse their results. While the differences between these statistics were small (up to 1.5%), some of their results showed predictions power around the same magnitude, which could have caused an issue with their analysis and is likely to have impacted the validity of their findings. The general conclusion from their three studies, which seems to be backed up by their data, is that reflective self-attention is the most important personality trait, along with openness, in predicting connection to nature and also the ability to increase existing connection to nature.

Study 2: Weinstein, Przybylski and Ryan (2009).

Weinstein, Przybylski and Ryan ran four studies, the first three of which used picture slides to show participants either an entirely nature based scene (such as a field with trees) or an almost entirely man-made scene (such as a city scape). Their participants were from a range of ages and backgrounds, although there was a gender bias, with twice as many women as men. This is common in psychology research, which tends to focus on readily available university psychology student populations. Weinstein, Przybylski and Ryan [CITATION Wei09 \n \t \l 2057] used MANOVA analyses to confirm that none of the participant demographics interacted with their results. Narration was used to help participants become immersed in the scene (image slide) they were observing, by encouraging them to imagine their senses, such as sensations, noises and smells, which they associated with the scene. Across the four studies, Weinstein, Przybylski and Ryan used a series of standard questionnaires to measure connection to nature, personal autonomy, intrinsic vs extrinsic aspirations and positive mood both before and after

observation of the image slides. The approach and measures used were similar to those used in this current dissertation study. However unlike this dissertation study, Weinstein, Przybylski and Ryan [CITATION Wei09 \n \t \l 2057] used a series of questions, similar to Schultz [CITATION Emp00 \n \t \l 2057], to measure how immersed the participants were in the scenes they observed. This provided a better understanding of whether the results were due to the activation of immersion. One of their key findings, was that a high level of immersion in the nature scene was highly correlated with intrinsic aspirations (such as relationships and community), whereas a high level of immersion in the man-made scene was highly correlated with extrinsic aspirations (such as fame and money). In the second study, mediation analysis showed that high immersion in the nature scene was significantly related to connection to nature. The research appeared to show that observing scenes of the natural environment increased connection to nature and also increased participants' tendency towards aspirations that protect the environment. It seems that deep immersion in scenes of nature caused a shift from extrinsic to intrinsic motivation.

Study 3: Schultz (2000).

Schultz ran two studies to investigate whether the degree to which people view themselves as interconnected with nature affects their motivations for being environmentally concerned. In his first study, he coded responses from a previous multinational, open ended survey of environmental concerns (US, Nicaragua, Peru, Mexico and Spain). After analysing the coding, he setup his own study with 245 US undergraduates in order to run a series of exploratory factor analyses followed by a confirmatory factor analysis to construct a three factor model of environmental concern. The final model contained twelve items, which split into three groups of four items loading on three separate factors, biospheric concerns, egoistic concerns and

altruistic concerns (see Figure 5). This model helped to show that individuals can be motivated to protect the environment for three very different reasons. Ego concerns relate to environmental issues that affect oneself directly, altruistic concerns relate to environmental issues that affect others (close to or far away from self) while bio concerns relate to issues that affect the natural environment itself. While the biospheric and egoistic dimensions formed well, the results show that the altruistic dimension was less well formed, with factor loadings in this category showing a marked split between concerns relating to those closer to self (‘people in my community’ and ‘my children’) compared to those further away (‘all people’ and ‘children’) (Schultz, 2000, p. 396). Schultz’s [CITATION Emp00 \n \t \l 2057] second study attempted to activate each of these three factors across the participants, through the use of perspectives. Participants were randomly assigned to three conditions and viewed images of either (1) recreational human activities in nature, (2) animals in nature or (3) animals being harmed by human activities. Schultz directed half the participants to observe the subjects of the images without concerning themselves with the views or feelings of the subjects. He directed the other half to adopt the perspective of the subject in each image and clearly visualise their feelings. In order to account for cross over between conditions, he used a series of questions after the experiment to test to what extent the participants had, or had not, entered into subjective perspective taking. Schultz’s results showed that there was a significant difference in objective vs subjective observation between the two sets of participants. The results also showed that only the dependent variables of biospheric and altruistic concern had significant interactions with the picture type and the perspective. From further analysis of these dependent variables, it was clear that taking on the perspective of the animals being harmed increased the reported concern for others, both in terms of nature (biospheric) and other people (altruistic). This runs counter to the earlier observation

that the altruistic dimension might cross over with the egoistic dimension. In his discussion, Schultz [CITATION Emp00 \n \t \l 2057] focused much more on the biospheric dimension and ignored the other two, possibly aiming to keep the reader's focus on the relationship between empathy and nature, in order to promote the validity of this new scale in relation to environmental studies.

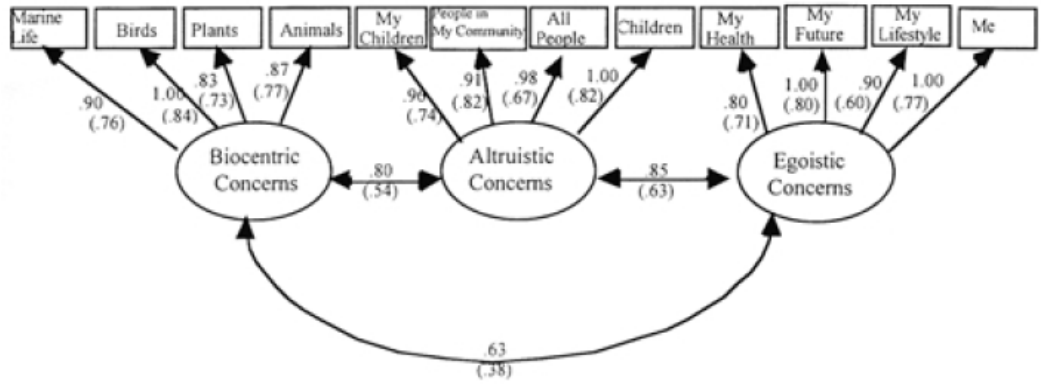

Figure 5 - Identification of three categories of motivation to protect the environment, reproduced from Schultz 2000, p.398

Study 4: Han and Hyun (2016).

Han and Hyun, conducted a study of 321 visitors to a museum in S. Korea, motivated by the interest in the museum industry to become more environmentally sound. The participant pool was well balanced between males (157) and females (164) and provided ecological validity by using a non-student population that accurately reflected the general population in S. Korea. They used a questionnaire built from previously published scales and concatenated them into a new 42 item 7-point scale. Their approach allowed several different factors to be assessed within the same survey, including: self-efficacy, environmental value, environmental concern, nature connection, environmental awareness, environmental knowledge, positive anticipated affect, negative anticipated affect, pro-environmental intentions and willingness to sacrifice. From their paper, it is clear that Han and Hyun [CITATION Han16 \n \t \l 2057] used extensive research

across all the relevant areas to choose their measurements. Using a structural equation modelling approach, Han and Hyun [CITATION Han16 \n \t \l 2057] were able to assess their 10 variables and 14 hypotheses in relation to each other. Their main focus was on predicting pro-environmental intentions, and they built a model that predicted this both directly and indirectly across all 10 variables. They used a bootstrap analysis to understand the mediating effect of variables that were path of the indirect prediction paths. Their results show that anticipated affect, predominately negative anticipated affect, had the biggest relationship to pro-environmental intentions, and that this was a mediating (or indirect) effect that explained the relationship of most of their other variables. Connection to nature and 'willingness to sacrifice' were the only two other variables with a direct significant relationship to pro-environmental intentions. Their results showed that the most important predictor of pro-environmental attitude was negative predicted affective outcome, and to a lesser extent, positive predicted affective outcome, and that these variables acted as important mediators. These findings were also supported by Hinds and Sparks [CITATION Hin08 \n \t \l 2057], who used predicted affective outcomes, and ecological identity to augment the theory of planned behaviour model, [CITATION Ajz91 \l 2057].

Creating a new intervention.

In line with Schultz [CITATION Emp00 \n \t \l 2057] findings on perspective taking and concern for the environment, discussed above, it was decided to include the mechanism of perspective in the empirical study for this dissertation. As Leopold [CITATION Leo49 \p viii \n \t \l 2057] wrote 'We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect'. Similarly, the findings of Smith, Coats and Walling [CITATION Smi99 \n \t \l 2057] suggested

that the ability to feel empathy is related to the degree to which humans recognise the other as part of their group. As discussed above, empathy, overlap, emotional attachment and personal motivation are key elements that activate both connection to nature and pro-environmental behaviour. Options for creating two alternate perspectives were explored that might activate these constructs differently. Research has shown the importance of home to humans, and the concept of home generally brings a sense of connection and belonging to people [CITATION Bar171 \l 2057]. Davis [CITATION Dav111 \n \t \l 2057] discussed how one of the eco-psychology perspectives is nature as our home, as a place where we can feel both connected and safe. The perspective of planet Earth as home was designed, by the author of this dissertation, to create a sense of overlap with the natural world, emotional attachment and personal motivation to look after nature as home, therefore leading to a sense of connection. The perspective of humans being separate from the natural world was designed to reduce the sense of connection with nature, although it is likely that empathy and possibly personal motivation to protect would be activated for some participants who had a particular concern for the natural world. This concern was measured as part of the study.

The approach of using priming to put participants into a particular perspective has been used many times in social psychology. While the approach has been the victim of methodological issues and difficulties with replication [CITATION Doy12 \t \l 2057], most of the issues appear to be related to covert approaches to priming, where the participants were unaware of the interaction, and believed that the priming task was ostensibly separate from another behavioural task. Davis, Green and Reed [CITATION Dav09 \n \t \l 2057] used the concept of priming to investigate the construct of commitment to nature. They focused on priming for strength of relationship with nature, by asking a series of open ended questions on topics such as how the

participants currently rely on nature in their daily lives. Although it is unclear if their method would be replicable, the approach used by Schultz [CITATION Emp00 \n \t \l 2057], which was a much more overt approach to priming, using clear perspectives, seems more robust. Referring back to the research on self-schemas above, the process of priming may be updating participants' schemas or may be accessing alternate schemas to change their perception of their relationship to nature.

Since the current study was focused on a computer based intervention, the option of incorporating an experience of real nature was dismissed. Several previous studies have used images, videos or personal visualisation of nature to successfully increase a sense of connection to and / or caring for nature (Mayer S. , Frantz, Bruehlman-Senecal, & Dolliver, 2009; Richardson & Sheffield, 2015; Scannell & Gifford, 2016; Schultz, 2000; Van den Born, Lenders, De Groot, & Huijsman, 2001). It was decided to use video as the medium for this study.

Measuring the effects.

To measure the effect of any intervention, it is important to find a scales or measures to properly measure the concepts being investigated. Before selecting the measurement instruments / scales to be used, it is worth important to consider the key performance measures of these measurement scales, namely standardisation, normalisation, reliability and validity [CITATION Cic94 \l 2057]; for test instruments to be useful, they need to meet certain criteria relating to these four areas. Regarding standardisation, the ability for a test to work over all ages, genders, educational levels and other demographics is extremely important; without this standardisation, a test can only reliably be administered to specific groups within a population [CITATION Cic94 \l 2057]. Normalisation may also be an important concept, depending on the intended use of the test results; in terms of personality and intelligence tests, normalisation refers

to the ability to map results across individuals [CITATION Cic94 \l 2057]. For example, a score for one individual can be compared to a score for another individual, only if the test is normalised across the population under test.

Reliability refers to several different concepts at the same time, but all these concepts relate to consistency [CITATION Cic94 \l 2057]. Test validity shows whether the items being used reflect the concepts the test was intended to measure [CITATION Cic94 \l 2057], which can be very tricky to assess, particularly with a concept that is difficult to define such as connection to nature. This was highlighted in the section Emotional affinity to nature. Consistency of results between tests and over time can also be measured [CITATION Cic94 \l 2057], however this is more applicable to trait rather than state measurements. For the current study, the interest was in state measurements. The most common measure for scale reliability is internal consistency, as measured by Cronbach's alpha [CITATION Cro90 \l 2057]. This provides an indication of how well the factors relate to each other, and therefore whether they are measuring the same concept or multiple concepts within the same scale.

Summary of Hypotheses

The main aim of this dissertation study was to understand the effect of using perspective in a short, computer-based intervention to influence connection to nature, and environmental attitudes. Based on the research, the relationship between these variables and several other variables such as emotional state, and environmental motives, which might moderate the effects of the intervention. The following is a summary of the hypotheses developed through the introduction of this dissertation:

1. There will be an increase in negative mood state for both perspectives
2. There will be a positive change in ego-motives, only for the perspective of separation
3. There will be a positive change in bio-motives, only for the perspective of connection
4. There will be a positive change in nature connection, only for the perspective of connection
5. There will be a positive change in environmental attitude for both perspectives
6. Increase in positive emotional state will be positively related to increase in connection to nature for both perspectives
7. Increase in negative emotional state will be positively related to increase in pro-environmental attitude for both perspectives
8. Change in environmental attitudes will be positively related to change in connection to nature for both perspectives
9. Post intervention connection to nature will be positively related to participants signing up to an environmental charity

Method

Participants

Participants were chosen using opportunity sampling from the psychology Masters Conversion course at Chester University (2016/2017), the psychology department at Chester University and from the personal network of the researcher. In total, 46 participants took part in the experiment and were randomly assigned to one of two groups: Group A, male = 11, female = 13; Group B, male = 11, female = 10. The only restriction placed on participation was being at least 18 years old. Exact ages were not captured as part of the study, however a mean age of approximately 30 was estimated, with a roughly normal distribution in the range of 18 to 50. Based on the observations of the experimenter, participants were majority Caucasian and British middle class.

Ethical approval was given by the University of Chester Psychology Department Ethics Committee. Participants were treated in accordance with the ethical guidelines of the British Psychological Society. See Appendix B for participant consent form.

Materials

Scales and measurements.

All measures selected below were subtly adapted where necessary to be presented in a state rather than trait form. For example, each question scale was presented with a statement asking the participant to rate ‘how they feel right now’, ‘in this moment’ or ‘as you are now, rather than how you would like to be in the future’. This was necessary since some scales ask about the past week or month in order to get more of a measure of trait.

Limited information was available on reliability, validity and normalisation, although the scales selected have been tested in multiple studies and appear to be suitable for their intended uses. A measure of internal reliability / constancy has been given for each scale and sub-scale.

Connection to nature.

As discussed at the beginning of this dissertation, there is a fundamental difficulty in assessing validity of self-report scales. For the purpose of this dissertation, the concept of connection to nature has been linked with the factors measured in the Connection to Nature Scale (CNS) which was designed to measure both affective and cognitive aspects of nature connection. The Connectedness to Nature scale (Cronbach's $\alpha = 0.84$), as used by Richardson and Sheffield self [CITATION Ric15 \n \t \l 2057], was therefore chosen as a measure of nature connection [CITATION May04 \l 2057].

Environmental attitudes.

To measure environmental attitudes, two scales were identified. The first identified items [CITATION Fra13 \l 2057] related to cognitive and emotional elements, although the research shows these are pretty much measuring the same concept. Cronbach's alpha was measured from studies across several countries between 1993 and 2010, with $\alpha > 0.70$ for the US. The second scale [CITATION Dav11 \t \l 2057] measured participants' willingness to sacrifice for the good of the environment ($\alpha = 0.88$). Using the same Likert response scale as the original scales, these two scales were concatenated together by the author of this dissertation into a single environmental attitude scale (EAS). Reliability was not separately tested or estimated for this concatenated scale.

Emotional state.

In order to measure emotional state before and after the intervention, the Positive and Negative Affect Schedule (PANAS) scale was selected. The scale contains two subscales, and shows good internal reliability for both positive affect, PANAS pos (α = 0.89) and negative affect, PANAS neg (α = 0.85) [CITATION Cra04 \l 2057].

Motivations for environmental concern.

To measure what motivates people in their environmental concern or motivation, a scale that measures environmental attitude was used, which contains three sub scales to compares the participant's motivations to protect the environment for self / ego (α = 0.71), others / altruism (α = 0.64) and nature / bio (α = 0.86) (Schultz, 2000).

Perspective prompts.

Text prompts were used to setup the perspectives of connection with, or separation from, the natural world, creating two groups within the participants: Group A with the perspective of separation from nature and Group B with the perspective of a sense of connection to nature. The prompts were aimed at creating a level of self-reflection to help build the concept behind each perspective; this approach was discussed by Richardson and Sheffield [CITATION Ric15 \n \t \l 2057]. The text prompts were designed to provide an invitation for participants to adopt the perspective, rather than defining the perspective as the correct way to interpret their relationship with nature. This approach was deemed important based on the research showing the importance of intrinsic motivation discussed in the introduction [CITATION Pel98 \l 2057].

- Prompt 1, group A - Look for moments in the following video clip where you feel humans have always been or have become separate from nature. Any moments you identify with this, please press the space bar.

- Prompt 1, group B - Look for moments in the following video clip where you feel part of nature, where you feel that planet Earth is home for you as a human as much as it is for all the plants and animals. Any moments you identify with this, please press the space bar.
- Prompt 2, group A - Now look for moments where you feel, as humans, we are damaging nature and putting the lives of animals and plants as serious risk. Any moments you feel this is shown, please press the space bar.
- Prompt 2, group B - Look for moments where you feel, as humans, we are damaging our own home, the planet we all live on together with the animals and plants. Any moments you feel this is shown, please press the space bar.

Perspective questions.

In a similar way to using perspective based prompts, perspective based questions were added after each video to encourage the participant to reflect on the video they had just seen from the perspective relevant to their group. This type of reflective attention to a particular perspective, has been shown to increase buy-in to a particular perspective [CITATION Ric171 \t \l 2057]. The participants were asked to press the space bar when they identified with the particular perspective in an attempt to keep them focused on the video and keep them focused on the perspective relevant to their group.

- Question 1, group A - Briefly describe, in writing, up to three separate moments in that video clip where you felt separate from nature, or you could see that humans are separate from nature.

- Question 1, group B - Briefly describe, in writing, up to three separate moments in that video clip where you felt part of nature, where you felt planet Earth is home for you as a human as much as it is for all the plants and animals.
- Question 2, group A - Briefly describe, in writing, up to three separate moments in that video clip where you felt, as humans, we are damaging nature and putting animals and plants at serious risk'.
- Question 2, group B - Briefly describe, in writing, up to three separate moments in that video clip where you felt, as humans, we are damaging our own home, the planet we all live on together with the animals and plants.

Video clips.

For this study, video was chosen as the medium for the intervention and was selected from a number of options already available to the public and free for use on YouTube. This professional quality video (https://www.youtube.com/watch?v=nAhemwK6lzk) was chosen to balance visual and educational aspects with an overview of the history of natural world and the effect of human population growth on nature. In Van den Born et al.'s [CITATION Riy01 \n \t \l 2057] study, narration was used to increase the participants' sense of immersion into the image they observed. The video selected for this dissertation experiment contained narration. The video was downloaded onto the experimenter's laptop so that a connection to the web was not necessary during the experiment. The combination of cognitive and affective processes of empathy and nature connection were discussed above, and both were deemed important. Knowledge of environmental issues has been shown to be a key factor in predicting pro-environmental behaviour e.g. [CITATION Hun90 \l 2057]. For the current study it was decided to use two sequential video clips, in order to first build the chosen perspective and then present

the damage caused by humans. The first clip (see Figure 6) focused on the history of the natural world on earth. The second clip (see Figure 7) focused on the loss through extinction of species on earth due to human activities. The focus of each clip was reinforced by the original professional narration provided with the video. The decision was taken to show both groups the same video clips, so that the only difference would be the prompt defining the perspective.

Figure 6 - Example video frame from first video clip for Group A

Figure 7 - Example video frame from second video clip for Group B

Charity signup.

In order to add a way to compare pro-environmental attitudes with pro-environmental behaviours, it was decided to add a final step where participants would believe the study was finished, but they would be asked if they wanted to sign up to an environmental charity. Four charities were chosen in order to give a spread of options: Friends of the Earth; Greenpeace; WWF; Trees for Cities. This was a slight deception, and was therefore made clear in the ethical approval process.

Procedure

The experiment was built using PsychoPy 1.85.1 (www.psychopy.org) and was administered in quiet, indoors environments using a laptop (Dell Latitude E6330) with a 13-inch screen. Audio volume was set at 40% on the laptop and full in Windows Media Player, used to play the video. Screen brightness was set to 100%.

Participants were asked to read the participant information sheet (Appendix C) and then to initial, date and sign the consent form (Appendix B). Figure 8 shows an overview of the

experimental procedure, which is followed by a detailed description of each step in the procedure.

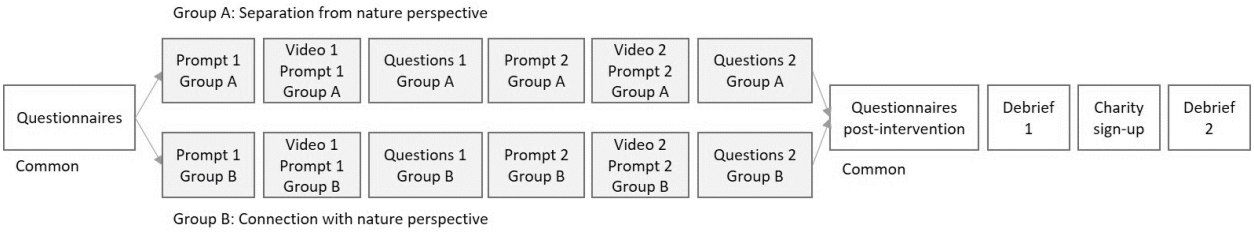

Figure 8 - Overview of the experimental procedure

Participants were presented with each of the seven questionnaires in the following order, with the following questionnaires with questions within each measure presented in random order:

1. PANAS (positive and negative)
2. Areas of environmental motivation (Ego, Altruistic, Bio)
3. Connection to Nature (CNS)
4. Environmental Attitudes (EAS)

Participants selected their response using the number keys on the laptop keyboard. For each questionnaire the scale changed, and the scale key (1 to 5, 1 to 7 or 1 to 9) was given at the bottom of the screen for each question. Once all the questions were answered, the participant was presented with the first video prompt relevant to their group, and asked to press any key when ready. The participant was then presented with the first video clip, with the first prompt relevant to their group superimposed at the bottom of the video. The participants were asked to press the space bar every time they related to the relevant perspective, this step was included to help keep participants focused on both the video and also on the perspective related to their group. Once

the first video clip had finished, the participant was presented with the first question relevant to their group. They were given the opportunity to provide the answer before pressing a particular key to continue. Once they had chosen to continue, the second prompt relevant to their group was displayed and they were asked to press any key to continue onto the second video clip. The second video clip was then shown with the prompt relevant to their group at the bottom of the video. Again, participants were asked to press the space bar to identify relevant moments from their group's perspective in order to keep them focused and present in their perspective. Once the second video clip had finished, the participant was presented with the second question relevant to their group and asked to provide their answer(s) before pressing a particular key to continue.

The participant was then presented, in the order listed, with the following questionnaires with questions within each measure presented in random order:

1. Environmental Attitudes (EAS)
2. Connection to Nature (CNS)
3. Areas of environmental motivation (Ego, Altruistic, Bio)
4. PANAS (pos and neg)

Once the participant had answered these questions they were asked to let the experimenter know, at which point they were given the debrief sheet to read (Appendix D). The participant was then shown four overview sheets from four different environmental charities (Appendix E) and asked if they would be interested in signing up to one of these charities, whether to make a donation, join a mailing list or volunteer. Their response was recorded and then they were informed, in a final debrief, that this had also been part of the experiment, and if they want to sign up I could send them the details for them to do it themselves (See Appendix F).

Analysis

SPSS v23 was used for the statistical analysis of the experimental data. For the comparison of pre, and post results from the various scales, 2x2 mixed ANOVA was used. This had two independent variables: group with two levels (group A and group B); and time with two levels (before and after the intervention). There was one dependent variable, the post-intervention measurement from the various scales. Normality was tested using the Shapiro-Wilk test as $N_{(condition)} < 50$ for each group. Homogeneity was tested using Box's M and Levene's tests. Correlation (2-tailed with significance level at 0.05) was used to understand the impact of certain moderator variables on the change in scores before and after the intervention. Multivariate correlation was performed across all the measures used both pre-intervention and post-intervention, to help understand the relationships between the different measures. Linear regression was used to test the relationship between Δ CNS and Δ EAS. An independent samples t-test was used to understand the relationship of post-intervention CNS to whether participants would sign up to an environmental charity, with the grouping variable: signup (yes, no). Pearson's r or partial η^2 (η_p^2) was used to describe effect size for all inferential statistics. It should be noted that in some situations, ω^2 may provide a more reliable effect size compared to partial η^2 since it attempts to correct for the population size, $\omega^2 = \frac{MS_M - MS_R}{MS_M + ((n-1) * MS_R)}$ [CITATION And03 \p 181 \l 2057]. However, it is also worth noting that the use of ω^2 has also been challenged [CITATION Ole03 \t \l 2057]. Effect size was assessed using the thresholds shown in Table 1.

Table 1 – Rule of thumb effect size thresholds as defined by Cohen [CITATION Coh88 \n \t \l 2057] and [CITATION And03 \l 2057]

Effect size	**Pearson's r**	**η_p^2**	**ω^2**	**% variance explained**
Small	0.10	0.01	0.01	1 %
Medium	0.30	0.06	0.09	9 %
Large	0.50	0.14	0.25	25 %

Results

Descriptive Statistics

Values given in tables 1, 2 and 3 have been adjusted by dividing the mean scores (and standard deviations) by the number of questions per scale, to provide adjusted, scale mean results. For example, positive mood state was divided by 10 because there were 10 questions in this part of the scale. The alternative would have been to present the final results from 10 to 50 rather than 1 to 5, but it was decided that the latter would be easier to interpret by the reader. All results shown below therefore lie within the scale min-max range.

Participants in group A were prompted to take the perspective that humanity is separate from the natural world and that humans are causing damage to nature. Group B were prompted to take the perspective that humanity is part of nature, and that humanity is damaging its own home.

Table 2 - Descriptive statistics for all measures before and after intervention for group A, adjusted (measure scaled by dividing values by the number of questions within the measure)

Measure	Before		After		Scale (min-max)	N
	Mean adj.	SD adj.	Mean adj.	SD adj.		
Positive Mood State	2.50	0.52	2.49	0.63	1 - 5	24
Negative Mood State	1.35	0.43	2.24	0.92	1 - 5	24
Environmental motive ego	4.46	1.57	4.63	1.71	1 - 7	24
Environmental motive altruistic	5.82	0.99	6.07	0.91	1 - 7	24
Environmental motive biosphere	5.50	1.38	6.21	0.94	1 - 7	24
Connection to Nature	3.50	0.65	3.62	0.68	1 - 5	24
Environmental Attitudes	5.96	1.12	6.53	1.06	1 - 9	24

Table 3 - Descriptive statistics for all measures before and after intervention for group B, adjusted (measures scaled by dividing values by the number of questions within the measure)

Measure	Before		After		Scale (min-max)	N
	Mean adj.	SD adj.	Mean adj.	SD adj.		

Positive Mood State	2.65	0.53	2.35	0.82	1 - 5	22
Negative Mood State	1.25	0.33	1.90	0.83	1 - 5	22
Environmental motive ego	4.45	1.18	4.68	1.43	1 - 7	22
Environmental motive altruistic	5.27	1.22	5.64	1.24	1 - 7	22
Environmental motive biosphere	5.25	0.99	5.84	0.88	1 - 7	22
Connection to Nature	3.39	0.51	3.70	0.58	1 - 5	22
Environmental Attitudes	5.82	1.30	6.29	1.39	1 - 9	22

Table 4 - Descriptive statistics for all measures before and after intervention for both groups combined, adjusted (scaled by dividing values by the number of questions within the measure)

Measure	Before		After		Scale	N
	Mean $^{adj.}$	SD $^{adj.}$	Mean $^{adj.}$	SD $^{adj.}$	(min – max)	
Positive Mood State	2.57	0.53	2.43	0.72	1 - 5	46
Negative Mood State	1.30	0.38	2.08	0.89	1 - 5	46
Environmental concern ego	4.46	1.38	4.65	1.56	1 - 7	46
Environmental concern altruistic	5.56	1.13	5.86	1.09	1 - 7	46
Environmental concern biosphere	5.38	1.21	6.03	0.92	1 - 7	46
Connection to Nature	3.45	0.58	3.66	0.63	1 - 5	46
Environmental Attitudes	5.89	1.20	6.41	1.22	1 - 9	46

Comparing tables 1, 2 and 3, it can be seen that scores for each measure before the intervention are very similar, and the same trends can be seen in each group. This is reflected in the similar standard deviations for each measure when split by group (tables 1 and 2) or combined (table 3). The biggest difference pre-intervention between groups appears to be for the altruistic environmental motivation, which shows a Cohen's d of 0.50 between groups, or change of 10.5% using the lower value as the baseline.

Figure 9 shows the percentage changes for each measure between group A and B. The biggest differences between groups can be seen in the percentage changes, before and after the intervention, for negative mood state (difference between groups of 14.68%), positive mood state (difference between groups of 10.98%), connection to nature (difference between groups of

5.89%) and altruistic concern (difference between groups of 2.00%). The biggest overall change, for both groups, was in negative mood state (average across groups 58.73%).

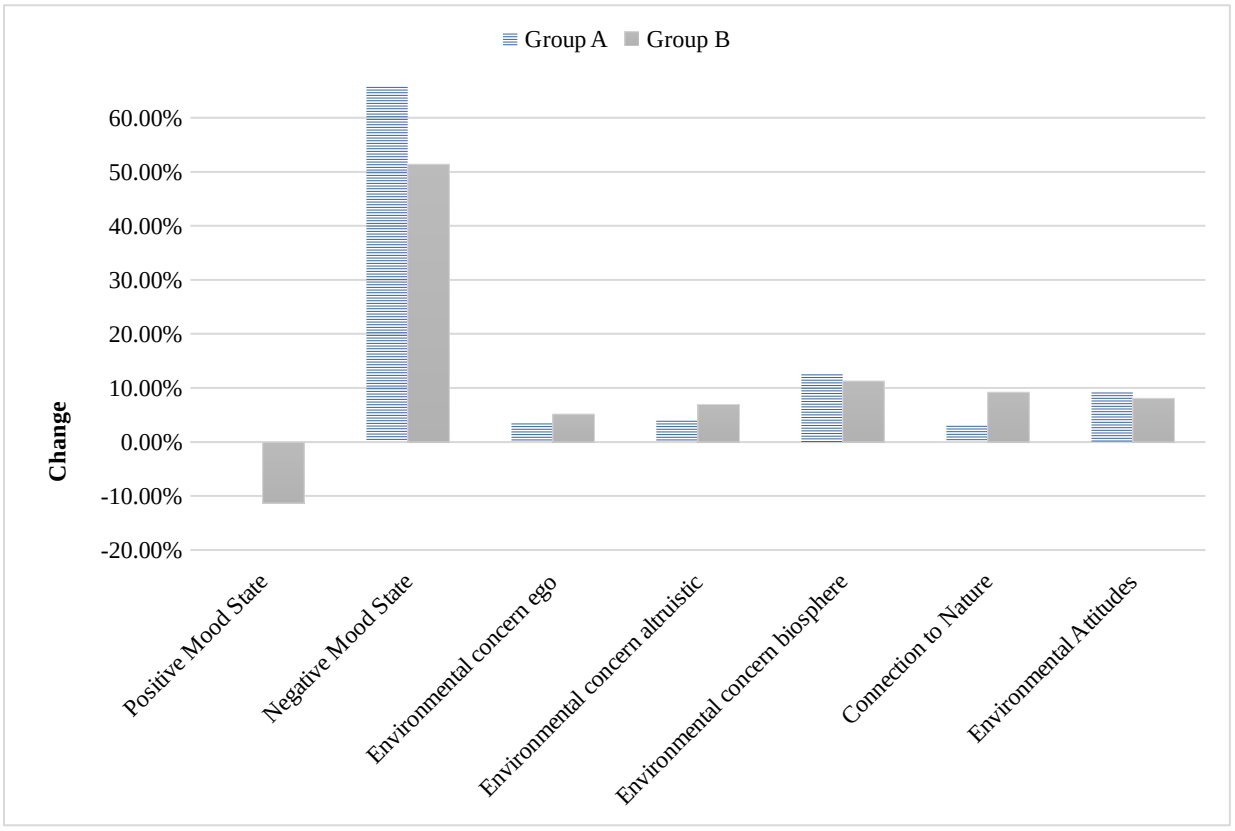

Figure 9 – Percentage change compared to baseline, for all measures from before to after intervention for group A vs group B

Inferential Statistics

Tests of homogeneity.

Levene's and Box's tests of homogeneity were performed on all dependent variables. None of the results were significant except PANAS positive mood. However, since there are very similar numbers of participants in each group, Box's M test is very sensitive, and ANOVA is a robust statistical measure, it was decided that of homogeneity of variance had not been violated [CITATION Tab13 \l 2057].

Hypothesis 1.

In order to assess the hypothesis that there would be an increase in negative mood state for both perspectives, the negative aspects of the PANAS measure were analysed. A two-way mixed ANOVA was performed on negative emotional state (PANAS neg) with perspective as the between-participants factor and time (before and after intervention) as the within-participants factor. The main effect of time was statistically significant: $F(1,44) = 38.637$, $p < .001$, the effect size, $\eta_p^2 = .46$, was very large. The main effect of perspective was not significant: $F(1,44) = 1.920$, $p = .173$, $\eta_p^2 = .04$, nor was the time x perspective interaction $F(1,44) = 0.991$, $p = .325$, $\eta_p^2 = .02$. This hypothesis was supported.

Hypothesis 2.

To test whether ego-motives had increased more for the separation perspective, a two-way mixed ANOVA was performed on ego motivated environmental concern (Ego), with perspective as the between-participants factor and time (before and after intervention) as the within-participants factor. The main effect of time on ego motivation was not statistically significant: $F(1,44) = 2.317$, $p = .135$, $\eta_p^2 = .05$, nor was the main effect of perspective on ego

motivation: $F(1,44) = 0.004$, $p = .950$, $\eta_p^2 = .00$, nor was the time x perspective interaction $F(1,44) = 0.055$, $p = .816$, $\eta_p^2 = .00$. This hypothesis was not supported.

Hypothesis 3.

To test whether bio-motives had increased more for the connected perspective, a two-way mixed ANOVA was performed on biospheric motivated environmental concern (Bio), with perspective as the between-participants factor and time (before and after intervention) as the within-participants factor. The main effect of time on biospheric motivation was statistically significant: $F(1,44) = 22.643$, $p < .001$, $\eta_p^2 = .34$, the effect size was large. The main effect of perspective was not significant: $F(1,44) = 1.169$, $p = .285$, $\eta_p^2 = .03$, nor was the time x perspective interaction $F(1,44) = 0.185$, $p = .669$, $\eta_p^2 = .00$. This hypothesis was not supported.

Hypothesis 4.

To test whether nature connection had been increased more for the connected perspective, a two-way mixed ANOVA was performed on nature connection (CNS), with perspective as the between-participants factor and time (before and after intervention) as the within-participants factor. The main effect of time on CNS was statistically significant: $F(1,44) = 5.949$, $p = .019$ $\eta_p^2 = .12$, the effect size was medium. The main effect of perspective on CNS was not significant: $F(1,44) = 0.010$, $p = .922$, $\eta_p^2 = .00$, nor was the time x perspective interaction $F(1,44) = 1.244$, $p = .271$, $\eta_p^2 = .03$. This hypothesis was not supported.

Hypothesis 5.

To test whether environmental attitudes had increased for both perspectives, a two-way mixed ANOVA was performed on Environmental Attitude (EAS), with perspective as the between-participants factor and time (before and after intervention) as the within-participants factor. The main effect of time on EAS was statistically significant: $F(1,44) = 26.788$, $p < .001$

η_p^2= .38, the effect size was large. The main effect of perspective on EAS was not significant: $F(1,44) = 0.298$, $p = .588$, $\eta_p^2 = .01$, nor was the time x perspective interaction $F(1,44) = 0.241$, $p = .626$, $\eta_p^2 = .01$. This hypothesis was supported.

Hypothesis 6.

To test whether changes in positive affect and nature connection were positively related for both perspectives, a linear correlation was run between the two. Change (Δ) in positive emotional state (PANAS pos) did not show a significant relationship with change in nature connection (Δ CNS) for group A (humanity separate from nature): Pearson correlation = - .18, $p = .389$, N = 24, however it did show a significant positive relationship for group B (nature as home): Pearson correlation = .44 (medium effect size), $p = .040$, N = 22. This hypothesis was not supported.

Hypothesis 7.

To test whether changes in negative mood and environmental attitude were positively related for both groups, a linear correlation was run between the two. Change in negative emotional state (Δ PANAS neg) showed a borderline significant positive relationship with change in Environmental Attitude (Δ EAS) for group A (humanity separate from nature): Pearson correlation = .40 (medium effect size), $p = .051$, N = 24. However, it did not show a significant relationship for group B (nature as home): Pearson correlation = .34, $p = .123$, N = 22. This hypothesis was not supported.

Hypothesis 8.

To test whether change in environmental attitudes and change in nature connection were related for both groups, a linear correlation was run, followed by a linear regression. Change in Environmental Attitude (Δ EAS) showed a significant positively relationship with change in

Connection to Nature (Δ CNS): Pearson correlation = .51 (large effect size), $p < 0.001$, N = 46. Change in Connection to Nature (Δ CNS) was found to predict a significant amount of variance (26.0% adjusted to 24.3% from R^2 and R_{adj}^2) in explaining change in Environmental Attitude (Δ EAS): ($F(1, 44) = 15.42$, $\beta = 0.51$, $p < .001$). This hypothesis was supported.

Hypothesis 9.

To test whether post-intervention nature connection (CNS) was related to whether participants signed up to an environmental charity, independent t-tests were used. The difference in means between those that asked to be signed up for a charity ($M = 52.14$, $SD = 2.66$) and those that asked not to be signed up ($M = 50.81$, $SD = 1.50$) was not significant $t(44) = .46$, $p = .645$, with no correction necessary. This hypothesis was not supported.

Further analysis.

In order to understand the relationships between the measures used, both before and after the intervention, multiple correlations were run across all the measures across both groups. This was done once for pre-intervention measures and once for post-intervention measures. Figure 10 shows results which were significant at the .01 level (two-tailed), to identify significant relationships between the measures used. See Appendix G for full correlation results.

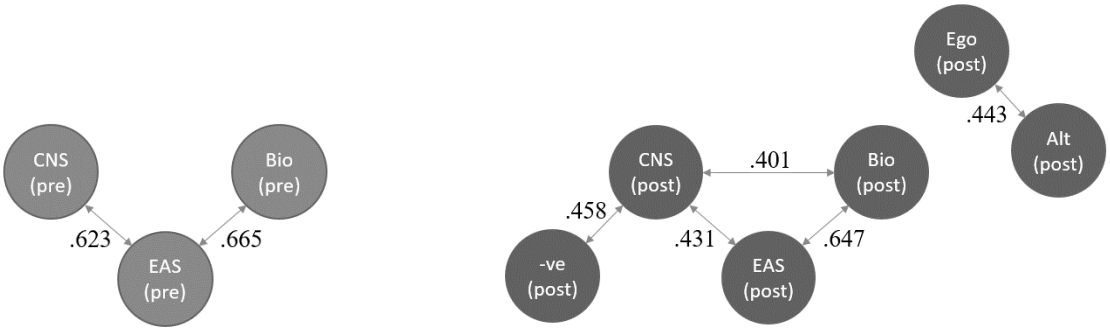

Figure 10 - Pearson's correlations for pre and post-intervention measures (those with significance at .01)

Given the lack of support for hypotheses six and seven, and the research by Han and Hyun [CITATION Han16 \n \t \l 2057] showing an increase in negative emotional state was a key predictor of an increase in pro-environmental attitude, it was decided to run a final correlation analysis to investigate the relationship between negative emotional state and nature connection.

Change in negative emotional state (Δ PANAS neg) showed a significant positive relationship with change in nature connection (CNS) for both groups. Group A (humanity separate from nature): Pearson correlation = .37 (large effect size), p = .037, N = 24. Group B (nature as home): Pearson correlation = .45 (large effect size), p = .018, N = 22.

Discussion

Findings

The aim of this study was to assess the effects of a short computer-based intervention on nature connection, and environmental attitudes, while also investigating several other variables that might act as moderators or meditators to these effects. The following is a summary of the hypotheses:

(1) negative mood state will be increased for both perspectives; (2) ego-motives will only be increased for the perspective of separation; (3) bio-motives will only be increased for the perspective of connection; (4) nature connection, as measured by the connection to nature scale (CNS), will be increased only for the perspective of connection; (5) environmental attitude will be increased (become more pro-environmental) for both perspectives; (6) change in positive emotional state will be positively related to change in nature connection for both perspectives; (7) change in negative emotional state will be positively related to change in environmental attitude for both perspectives; (8) change in environmental attitudes will be positively related to change in nature connection for both perspectives; (9) post intervention nature connection will be positively related to participants signing up to an environmental charity.

Hypotheses one, five and eight were supported, with the null hypothesis being retained for the others. The independent variable of perspective did not show a significant effect for any of the hypotheses. This was not predicted and is discussed below. A significant finding from this study was that the intervention had a large and significant effect ($\eta_p^2 = .38$) on environmental attitudes for both perspectives, in support of hypothesis five. The intervention was also shown to have increased overall nature connection for both perspectives, but the size of the effect was less ($\eta_p^2 = .12$). This was not as predicted, since it was expected that the perspective of connection to

nature (nature as home) would lead to a significantly greater increase in connection to nature. Possible reasons for this are discussed below. Negative mood state was significantly increased by the intervention for both groups, which may have had unanticipated effects, as discussed below.

As defined above, two perspectives were used, one designed to prime a sense of separation from nature and one designed to prime a sense of connection to nature through the concept of nature as home. During the intervention, both groups watched the same video content, the only differences between groups were the prompts used to prime the two perspectives and the questions used to reinforce those perspectives. Although there was no measure of how much the participants adopted the perspective they were assigned, reading the comments following the first video (see Appendix H) showed differences between the groups. Group A (perspective of separation) were generally more focused on the negative issues of separation than group B (perspective of connection), who were more focused on the beauty and power of nature (see Table 5 for examples). These differences suggested that the intervention was successful in creating two distinct perspectives between the groups. However, the depth to which these perspectives were activated was not measured.

Table 5 - Examples of participants' written comments after first video

Group A comments after first video	Group B comments after first video
View of congested city, full of cars. mass of people on beach, with no apparent connection with their natural surroundings, plastic bottle/rubbish	Underwater with coral and fish. Time lapse urban scenes. Ants crawling up the leaf.
Over population. Extinction of animals due to human interaction.	The moment where it explained how life first began. Also the field full of flowers.
Rubbish in the river, big water plantation and people using cars without second thoughts	Water, ferns and people drawn on the wall

As mentioned above, the study did not show a significant difference between the perspectives, in terms of the changes measured for the key dependent variables of nature connection and environmental attitude. One reason for this may have been related to the depth and robustness of these perspectives, meaning that the perspectives were not activated strongly enough to create the differences predicted between groups. However, it was also possible that the large increase in negative emotion swamped any effects due to perspective, effectively creating noise from a strong confounding factor. It was possible that negative emotion was the key mechanism that drove the positive shift in nature connection. This was supported by reading the comments following the second video, which showed that both groups focused on the strong negative aspects of that second video (see Table 6 for examples). The extra analysis shown in the results section also supports the possibility that negative mood swamped the perspective in terms of nature connection. The results show that negative mood state had a significant and large relationship with nature connection. It therefore appears that by the end of the second video, the intended perspectives, of connection and separation, may have become less distinct, blending into a single strong perspective focused on the negative aspects of human impact on nature, as portrayed in the second video.

Table 6 - Examples of participants' written comments after second video

Group A comments after first video	Group B comments after first video
Expanding population is putting extreme pressure on all other life on earth. The increasing demand on resources is causing pollution and climate change.	The various mentions of animals becoming extinct. The mentions of the issues climate change is causing.
Elephant that had been shot. Climate change. Orang-utans under threat.	Plastic, water pollution and hunting
Video of recently extinct species. Statistics on extinction threats. Forecasts of loss of biodiversity.	Plastic bottle image, dead elephant and other dead animal in wasteland

As discussed in the section Influencing Connection to Nature, Han and Hyun [CITATION Han16 \n \t \l 2057] found that an increase in negative emotional state was a key predictor of an increase in pro-environmental attitude, which was predicted in hypothesis seven. However, in contrast to the results seen for nature connection, neither perspective showed a significant relationship with negative mood, and therefore hypothesis seven was not supported. It is not clear why this would have happened, especially since change in environmental attitude was shown to be positively related to change in nature connection. One possibility is related to self-efficacy as discussed in the section *Motivation, approval and efficacy.* While nature connection was a measure of relationship with nature, environmental attitude was a measure of a willingness to behave, and as Fransson and Garling [CITATION FRA99 \n \t \l 2057] found, it is important for people to believe they can make a difference before they are willing to act. Given the negative messages presented in the second video, it is possible that people felt they could not make a difference, and so decided they would not be willing to make sacrifices that would not make a significant difference to protecting the environment. This is discussed below regarding Terror Management Theory.

Another possibility is that the perspectives were well separated and well established, and that they were strong enough to measure an interaction effect, but that each perspective created the same outcome through different applications of the mechanism of empathy. Kals, Schumacher, & Montada [CITATION Kal99 \n \t \l 2057] specifically identified emotional affinity towards nature as a key aspect that drove behaviour. Their research found that almost half (47%), of environmentally protective behaviours measured were explained by a combination of: emotional affinity towards nature; a sense of unfair treatment of nature; and an interest in nature. Davis [CITATION Dav96 \n \t \l 2057] noted that giving participants instructions to

imagine the affective state of a target caused the participants to want to offer help. The intervention used in this dissertation did ask participants to consider the impact of humans on nature and created a strong affective state, in both perspectives. This suggests that irrespective of the intended perspective, a degree of empathy and compassion was likely to have been created in all the participants, potentially increasing Connection to Nature (CNS) and Environmental Attitude (EAS), for both perspectives and in similar amounts.

Hypothesis four was not supported since the interaction of time by perspective was not significant. Figure 11 shows that there was a bigger change in CNS for the connected perspective than the separate perspective. Since the effect size was small ($\eta_p^2 = .03$) it may be that there was too much noise to find a significant interaction. The observed power in this test was $\beta = .67$. Using GPower (http://www.gpower.hhu.de/en.html) to determine the required number of participants from desired power, it suggested that future studies would need an extra 20 participants to achieve a β of .80 in order to stand a chance of demonstrating significance.

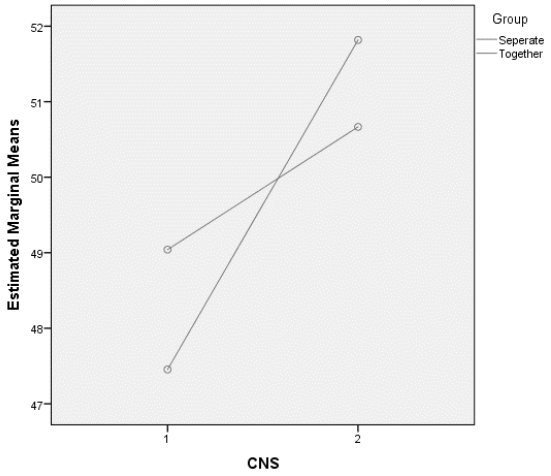

Figure 11 - Interaction of Group x Time for Connection to Nature (CNS) from SPSS, note – y-axis scores have not been scaled in this plot and range from 14 to 70.

Capaldi, Dopko, & Zelenski [CITATION Cap14 \n \t \l 2057] identified positive affect to be positively correlated with connection to nature, in their meta-analysis of 30 studies.

Hypothesis six predicted that the same effect would be seen in this dissertation study, which was not supported. Surprisingly, change in positive affect was only significantly related to change in nature connection for the perspective of connection with nature.

Hypotheses two and three focused on egoistic and biospheric concepts of the personal motivations relating to the environment, as identified by Schultz [CITATION Emp00 \n \t \l 2057]. It was hoped that by measuring these factors, it would help demonstrate whether the perspectives had a measureable effect on the participants. If egoistic and biospheric motivations had changed in opposite directions for each group, as predicted, this would have indicated that each group had adopted a different perspective in relating themselves to the natural world. However, although this was not seen, it does not mean that the priming of perspectives was not successful. It may have meant that the priming was overridden by the strong effect of negative emotion, as described above, or it may have meant that the factors of egoistic and biospheric motivations were not well linked with the perspectives being activated. The large and significant increase in biospheric motivation for both groups was similar to that measured for environmental attitude. This was reflected by the strong and significant correlation between environmental attitude and biospheric motivation both before and after the intervention (see Figure 10).

The significant positive relationship between change in Environmental Attitude (Δ EAS) and change in nature connection (Δ CNS) before and after the intervention, was predicted by a large amount of the research discussed in the introduction, including (Frantz & Mayer, 2013; Richardson & Sheffield, 2017; Schultz, 2000) and hypothesis eight was indeed supported. This result was not surprising, and the effect was large. The Δ CNS predicted almost 25% of the variance in Δ EAS, which showed that change in nature connection was important in predicting

change in environmental attitude. As discussed in the limitation section, the results showed relationship but were not able to demonstrate causality.

Hypothesis nine was not supported. It predicted that the strength of nature connection at the end of the intervention would predict the likelihood of participants signing up to one of the environmental charities. With the relatively small sample size, it was difficult to reach any conclusions about why this hypothesis was not supported by the results. However, it was likely that there were a large number of contributing factors relating to individual differences and preferences of the participants. The main reasons given for signing up, or not, may shed light on how charities can bring more people on board in a way that supports the charity and doesn't negatively affect the individuals. Approximately one third of participants agreed to be signed up to a charity. Table 7 gives examples of participants' thoughts when asked why they wanted to sign up. The comments were captured by the experimenter verbally, and then transcribed (see Appendix H for full responses).

Table 7 - Examples of participants' comments regarding signing up to a charity

Agreed to signing up	Did not agree to signing up
Interested in affecting policy relating to environment. Really concerned about species extinction due to human activity	Charities aren't so relevant to me. I already donate to WWF and mainly people charities. Also, don't have much money as a student, would prefer local charity
Already support RSPB. Feeling sympathy and pity for the animals when saw dead elephant and other baby animals. Feels that we are spoiling and destroying the environment	Doesn't like to be put on the spot to sign up or feel forced. Also, prefers to pick a specific charity and focus on that over a long term

Interested in a mailing list, but don't want to sign up to an ongoing direct debit, and want to be sure that the money goes to the cause that really needs it	Would like to do own research, feel a bit sceptical under pressure. Interested to sign up, perhaps for WWF, but need to think about first. Thought the videos brought home the reality of environmental issues

In general the reasons not to sign up were focused around: not enough money; not enough time; lack of trust for how charities spend their money; desire to do more research; dislike of being put under pressure to make a decision; dislike of getting bombarded by emails; already donating to related charities. Participants were motivated to sign up generally based on the key messages from the video of: extinction of animals; human damage to the environment.

The step of offering signup to a charity was included to test whether participants would take concrete pro-environmental action on top of simply expressing a stronger pro-environmental attitude. The results show that generally this is not the case. However, the results are clearly confounded by the factors mentioned above, relating to whether they could afford to sign up or whether they really believe it would make a positive difference. This was directly related to the concepts discussed in the section *Motivation, approval and efficacy.*

Theoretical Implications

As expected, the change in environmental attitude was positively related to the change in connection to nature using the CNS measure. However, this was counter to what Perkins [CITATION Per10 \n \t \l 2057] found, and supports the earlier assessment in this dissertation that part of Perkins' statistical approach was flawed. The implication was that CNS was indeed a valid measure of nature connection when assessing the link between nature connection and, for example, environmental attitude.

As highlighted in the introduction, the available research has not fully defined nor perhaps understood the mechanisms involved in human connection to nature. This issue also means that it was not possible to tease apart the various aspects of nature connection in order to be able to test novel approaches to increasing participants' connection to nature. It was unclear, as discussed above, how much of the affective or cognitive aspects of connection were being measured in this dissertation study, and if connection to nature specifically or connection in general was being measured. This will continue to affect nature connection research until more understanding is achieved.

From the correlation between measures, both pre and post-intervention, it can be seen that environmental attitude (EAS) and biospheric motivation appeared to measure the same thing. This suggests that it is only necessary to use one of these measures in the future. The environmental motivations measure may be a better option since it provides additional information about egotistic and altruistic motivations, while using a similar number of items to the EAS measure.

The significant relationship between negative mood state and nature connection, but not positive mood state and nature connection ran counter to the available research. While most research indicated a strong relationship between happiness and nature connection, it was possible that happiness was generated by spending time in nature rather than by an increase in nature connection. Since this study increased nature connection without any time in nature, it was possible to separate these two effects. This also has an important practical implication, that time in nature should be an important part of any intervention to increase connection to nature.

Practical Implications

Given the significant impact that negative emotions had on increasing people's pro-environmental attitudes, it is clearly a tempting tactic to use negative emotions to in promote environmental behaviours. To understand the implications of using negative emotions it is possible to turn to Terror Management Theory. This theory suggests that, in the presence of knowledge of the potential for death, people will act to reduce that potential [CITATION Gre86 \l 2057]. In the case of exposure to the sun for example, many anti-sun exposure adverts used the potential of skin cancer to persuade people to use sun screen or not to spend time in the sun [CITATION Mor14 \l 2057]. However, in their research, Morris, et al., found that social desirability of a sun tan might have been causing people to take risks even in the knowledge of the risks. This finding seems quite relevant to interventions focused on changing environmental behaviours. Using this information, it can predict that although negative emotions may change people's attitudes towards environmental protection, they will be unlikely to make pro-environmental decisions, such as giving up a car, or not eating meat, because of the social and personal implications of doing so. There are also ethical issues surrounding an approach that focuses on increasing negative mood, both in terms of full disclosure of intent and in terms of people's wellbeing. Inducing negative moods in people may have a detrimental effect over time, and the research suggests that there are better ways to create behaviour change, such as promoting response effectiveness and self-efficacy [CITATION Rui14 \l 2057].

If connection to nature is analogous to depth of relationship, the consequence of forming a deep relationship with something that is suffering greatly could have a traumatic effect on people. Davis [CITATION Dav111 \n \t \l 2057] explains how a deep sense of personal transcendence allows individuals to accept and even appreciate both the good and the bad.

Mindfulness and other related practices have been shown to support people in somewhat analogous situations of suffering, grief and loss [CITATION Tac11 \l 2057]. This same mindful awareness and reflection has also been shown to help connect people to nature [CITATION Ric15 \t \l 2057]. Therefore, any efforts to build a sense of connection with nature, both small scale and large scale, should seriously consider the potential negative impact on emotional wellbeing of the people targeted. The proven potential for mindfulness to moderate this decline in emotional wellbeing means that its use should be considered as part of any nature connection campaign. It may be that this would have the added benefit of increasing the effectiveness of connection with nature initiatives. It would also be worth considering the implications of widespread mindfulness teaching, which include ethical issues related to not simply using mindfulness to alleviate specific symptoms [CITATION Mon15 \l 2057], and mitigating health risk factors in participants by ensuring that facilitators are properly trained [CITATION Edo14 \l 2057].

Schubert [CITATION Sch17 \n \t \l 2057] discussed the issues of ‘green nudges’ and whether they are ethical. By nudges Schubert refers to subtle priming approaches designed to affect peoples’ behaviour. His key conclusions are that: the effectiveness of the nudge needs to be fairly substantial, to avoid pointless negative impacts; nudges should be part of a more traditional incentive-based approach, which rewards people for their commitment; there should be a level of transparency around what a nudge is trying to achieve and perhaps even how it seeks to do so, in terms of full disclosure as mentioned above. Hudson & Roberts [CITATION Hud14 \n \t \l 2057] found that despite an intention to change, people tend to avoid the day to day behaviours necessary to create changes in their personality. Their research demonstrates that humans are not good at creating the change they wish to see in themselves, and perhaps supports the case for

external interventions to help individuals create meaningful change in their lives, such as a stronger relationship with nature in order to support personal wellbeing and a healthy natural world. Perhaps a better way to do this would be through promoting connection to nature using positive images and messages, since an increase in connection has previously been shown to be related to positive mood (Capaldi, Dopko, & Zelenski, 2014; Weinstein, Przybylski, & Ryan, 2009).

Given the lack of significant relationship between nature connection and the willingness to sign up to environmental charities plus the complex set of reasons why participants did not sign up, charities should not expect nature based interventions to increase their donation levels.

Limitations

Although this study did show several significant main effects, several limitations can be identified with the research. As already discussed, there was no measure of the depth to which each perspective was activated in each of the participants. Although anecdotal evidence was available from a cursory analysis of the qualitative data, conclusions about the effectiveness of the intervention to activate perspectives are limited. In turn, it was difficult to draw conclusions about whether the two perspectives (connection to nature vs separation from nature) had different effects on nature connection and environmental attitudes. As discussed above, possible confounding factor of negative emotions overwhelming the activation of the perspectives may have led to type II errors, making it impossible to identify the indented effect of perspective on nature connection and environmental attitude.

Since full demographics of the participants were not captured, any effects of demographics on the results could not be analysed. However, it was clear that the majority of

participants were middle class, British Caucasians, which means that there was a bias in the participants that is unlikely to be reflective of the broader British or international society.

Another potential issue was the lack of follow up measures to understand the durability of the effects. This has been an issue with many studies, which tend to focus on short term rather than long term longitudinal analyses.

It was not possible to conclude causality in the relationship between change in nature connection and change in environmental attitude. To do this, it would have been necessary to more carefully manipulate the factors independently. Thus, it is likely that an increase in CNS would have been seen after the first video, which was focused on the evolution of the natural world in general. However, the second video focused on the destruction of the natural world, particularly on the extinction of animals, which is likely to have created the negative emotions, shown to increase EAS. This is addressed in the *Future Work* section below.

Future Work

There is a great deal of future work that can be done in this area. Based on the low power and small effect sizes of the interactions, this empirical study can therefore be thought of as a pilot study, where a follow up study would target more participants, perhaps using an online platform to administer the intervention to achieve a much broader audience.

As previously discussed, different video clips could be used to create a more positive emotional state in order to focus more on connection with nature, rather than the impact of negative mood state. In this approach, to include the aspect of perspective, there could be three groups: Group A with a more positive video and prompt for the connected perspective; group B with the more positive video and a prompt for the separate perspective; group C with a neutral

video and the prompt for the connected perspective. The more positive video could be modelled on the images of nature used by Richardson and Sheffield [CITATION Ric15 \n \t \l 2057].

Another improvement to the current study would be to measure the degree to which each participant was embedded into a perspective. This could be done in a similar way to Schultz (2000) using a small number of relevant questions to overtly ask the participants whether they had watched the videos from the intended perspective. This could be augmented even further by adding a mid-point measure of nature connection and environmental attitude between the videos, which would allow these concepts to be explored in isolation and potentially allow assessment of causality in terms of an increase in CNS leading to an increase in EAS.

Finally, designing a follow-up intervention including immersion in nature would allow the relationships between the computer based intervention and immersive nature based interventions to be better understood. Eventually, a hybrid approach where computer based materials are used in unison with bringing nature (such as plants) into the lab or inviting some participants to attend a follow-up session in a natural place could be designed. This hybrid approach was tested to some degree by Weinstein, Przybylski, & Ryan [CITATION Wei09 \n \t \l 2057] across four studies. They compared different approaches to immersing participants in natural vs urban environments, which included photos of natural or urban environments and labs where features from the natural environment were included in the experimental room environment.

Conclusion

This study aimed to investigate the difference between two perspectives, separation from nature and nature as home, within a short computer-based intervention designed to manipulate the dependent variables of nature connection and environmental attitude. The results showed that

nature connection and pro-environmental attitude were both increased after the intervention. Connection to nature was shown not to have a significant relationship to the decision to sign up to environmental charities, and it appears there are a range of complex issues at play in people's decisions to join a charity. Changes in nature connection were shown to be positively related to changes in environmental attitude. Finally, it was found that negative mood state rather than positive mood state was significantly related to change in nature connection, which was not predicted by the research. From the previous research and results of this study, there remains an important issue with understanding what is really meant by nature connection, and what aspects are being measured with the connection to nature scale (CNS).

The two different perspectives showed no significant differential relationships in results from this study, which could be due to several factors including: a weak activation of the perspectives; two different empathetic responses leading to the same outcome; the *swamping* of the perspectives by negative mood state. Although the effective use of perspectives was not shown in this study, given the importance of perspective in how humans relate to the world around them [CITATION McH12 \t \l 2057], this approach requires future research to fully understand how to better operationalise this mechanism.

While it may be tempting to target a negative emotional state as part of an intervention focused on creating pro-environmental behaviours, the results from this study show that it may not have the intended effect, and that particular approach has serious ethical flaws. A better approach would be to focus on how an individual can create effective change, based on intrinsic motivation, and to involve people in nature based activities to raise their awareness of environmental issues and positively impact their happiness and wellbeing. Any attempt to increase connection to nature needs to carefully consider the potential of negative emotions

associated with the current reality of the damage being done to the natural world. Using mindfulness as an approach to deal with this is a possibility, since it can also help with the process of connection, however this too needs to be applied with some caution.

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Appendix A – Scales / Measures

PANAS (pos, neg)

So that you can describe yourself in an honest manner, your responses to all questions will be kept in absolute confidence. This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. Indicate to what extent you feel this way right now, that is, at the present moment.

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

	Item	**Score (1-5)**
1	Interested	
2	Distressed	
3	Excited	
4	Upset	
5	Strong	
6	Guilty	
7	Scared	
8	Hostile	

9	Enthusiastic	
10	Proud	
11	Irritable	
12	Alert	
13	Ashamed	
14	Inspired	
15	Nervous	
16	Determined	
17	Attentive	
18	Jittery	
19	Active	

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20	Afraid	

Environmental Motivations Scale (Ego, Altruistic, Bio)

People around the world are generally concerned about environmental problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them the most. There are no right or wrong answers. Using the following scale in the space provided next to each item, as honestly and candidly as you can, please note how concerned you are for each one.

1	2	3	4	5	6	7
Not Important						Supreme Importance

I am concerned about environmental problems because of the consequences for:

	Item	**Score (1-7)**
1	Plants	
2	Me	
3	People in the community	
4	Marine life	
5	My lifestyle	
6	All people	
7	Birds	

8	My health	
9	Children	
10	Animals	
11	My future	
12	Future generations	

Connection to Nature Scale (CNS)

Please answer each of these questions in terms of the way you feel right now, in this moment. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

	Item	**Score (1-5)**
1	I feel a sense of oneness with the natural world around me.	
2	I think of the natural world as a community to which I belong.	
3	I recognize and appreciate the intelligence of other living organisms.	
4	I feel disconnected from nature.	
5	When I think of my life, I imagine myself to be part of a larger cyclical process of living.	
6	I feel a kinship with plants and animals.	
7	I feel as though I belong to the earth as equally as it belongs to me.	

8	I have a deep understanding of how my actions affect the natural world.	
9	I feel part of the web of life.	
10	I feel that all inhabitants of Earth, human, and nonhuman, share a common ‘life force.’	
11	Like a tree can be part of a forest, I feel embedded within the broader natural world.	
12	When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.	
13	I feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or he birds in the trees.	
14	My personal welfare is independent of the welfare of the natural world.	

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Environmental Attitudes Scale (EAS)

1	2	3	4	5	6	7	8	9
Do not agree at all / Not at all				Somewhat agree				Agree completely / Completely

Please answer each of these questions in terms of the way you feel right now, in this moment. There are no right or wrong answers. Using the following scale in the space provided next to each question, as honestly and candidly as you can, rate how you feel right now.

	Item	**Score (1-9)**
1	I am willing to give things up that I like doing if they harm the natural environment.	
2	I am willing to take on responsibilities that will help conserve the natural environment.	
3	I am willing to do things for the environment, even if I'm not thanked for my efforts.	
4	Even when it is inconvenient to me, I am willing to do what I think is best for the environment.	
5	I am willing to go out of my way to do what is best for the environment.	
6	I am willing to do what is right for the environment, even when it costs more money or takes more time	

7	How willing would you be to accept cuts in your standard of living in order to protect the environment?	
8	How willing would you be to pay much higher prices in order to protect the environment?	
9	How willing would you be to pay much higher taxes in order to protect the environment?	
10	Modern science will solve our environmental problems with little change to our way of living	
11	People worry too much about human progress harming the environment	
12	We worry too much about the future of the environment and not enough about prices and jobs	
13	It is just too difficult for someone like me to do much about the environment	
14	In order to protect the environment, the country needs economic growth	

Appendix B – Informed Consent Form

Department of Psychology
University of Chester

RESEARCH INFORMED CONSENT FORM

Title of Project:	Does strength of connection to nature and humanity affect pro-environmental behaviour	**Ethics Approval Number:**	TGLHW040517
Investigator(s):	Thomas Goldstein	**Researcher Email:**	1621050@chester.ac.uk

Please read the following statements and, if you agree, initial the corresponding box to confirm agreement:

	Initials
I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.	
I understand that my data will be treated confidentially and any publication resulting from this work will report only data that does **not** identify me.	
I freely agree to participate in this study.	

Signatures:

Name of participant (block capitals)	Date	Signature
Researcher (block capitals)	Date	Signature

If you would like a copy of this consent form to keep, please ask the researcher. If you have any complaints or concerns about this research, you can direct these, in writing, to the project supervisor, Dr Lee Hulbert-Williams l.hulbertwilliams@chester.ac.uk or 01244 511978.

Appendix C – Participant Information Sheet

You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask me if you would like more information or if there is anything that you do not understand. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

Thank you for reading this.

What is the purpose of the study?

This is an academic study investigating how environmental attitudes vary with our sense of place in relation to the natural world, and how this may be affected simply by the way film-makers tell their story.

Why have I been chosen to take part?

You have been chosen to take part in this study as you have volunteered to take part.

What do I have to do?

You will be asked to respond to a short series of questions as part of a survey. You will then watch two videos, with specific prompts and questions before and after each video. Finally, you will be asked to fill out some more questions. All survey responses will be anonymous.

What about confidentiality?

All responses are confidential. All answers will be anonymised automatically. Any written answers that you give maybe reviewed by me for interesting information relating to the area of study, but will be kept on password protected memory stick. In the unlikely event that you reveal personal information in your written answers, **and** disclose information that concerns

potential or actual harm to people or criminal activity, then confidentiality may be breached. As a researcher, I would have to take advice concerning the most appropriate course of action should this situation arise.

Who is conducting the study?

I am the principle researcher and am currently studying Psychology at the University of Chester. I will be responsible for conducting the study and analysing the data which will contribute to my dissertation.

What about the results?

The results will be analysed and used for my dissertation. Any quotes will be anonymised and will only be used to illustrate the main results. If published, all information, data and results will be kept anonymous.

Is participation voluntary?

Participation in the study is entirely voluntary. You can withdraw at any time during the experiment simply by letting me know, there is no problem or issue with doing this. You don't need to give me any reason. Once the experiment is over and you leave the room, you will be unable to withdraw from the study. There will be no financial incentive or payment given relating to participation.

What are the risks/benefits of taking part in the study?

The slight risk involved in taking part in this study is that you feel some discomfort or some unpleasant emotion due to the subject or content of the videos (environmental issues). If you feel uneasy about the experiment, please let me know and you can stop at any time. The aim of the study is to find out more about how people react to information about environmental issues in different contexts. There are no right or wrong answers and none of the questions can

be used to diagnose or such like. All the data I collect will be analysed as a group, thereby limiting identification of individual participants. The benefit of participating in this study is that it will enable me to conduct a quantitative study that forms part of my dissertation for my masters. If the experiment works well, there is also the chance that the data might be combined with the data from other studies, and written up for publication.

4 RPS credits are available for taking part in this study.

What if I am unhappy or if there is a problem?

If you have any questions, problems or complaints regarding the study, please contact the supervisor for this assignment, Dr Lee Hulbert-Williams on l.hulbertwilliams@chester.ac.uk or 01244 511978, or contact the Head of Department, Prof Ros Bramwell (r.bramwell@chester.ac.uk).

Ethical Approval

Ethical approval for the study has been sought and obtained from The Department of Psychology Ethics Committee.

Appendix D – Main Participant Debrief

Thank you very much for participating in this study.

What was the purpose of the study?

This is an academic study investigating how environmental attitudes vary with our sense of place in relation to the natural world, and how this may be affected by a simple intervention. The hypotheses are: that a strong sense of connection to the natural world, and seeing oneself as part of nature, will correlate positively with pro-environmental attitudes and behaviour; and that by identifying with being an integral part of nature, this nature connection and pro-environmental attitudes will be affected.

Delete as appropriate - You were in the Experimental group, which means you were prompted to identify with a sense of connection to nature and this was reinforced with your observations.

Delete as appropriate - You were in the Control group, which means you were prompted to identify with humans being separate from the natural world and this was reinforced with your observations.

What if I am unhappy or if there is a problem?

In this experiment, we were careful only to use videos freely available on sites like YouTube, and not age-restricted. We do not anticipate any psychological distress resulting from this study, though of course some people will find the topic of the videos somewhat emotional.

This video provides a positive outlook on environmental concerns and explains how we can start to achieve any change that maybe necessary: https://www.youtube.com/watch?v=8YQIaOldDU8

If you feel that you need support with your mental health, please contact your GP.

If you are unhappy with the way in which this research project is being run, please contact my supervisor, Dr Lee Hulbert-Williams (email: l.hulbertwilliams@chester.ac.uk, telephone: 01244 511978) or the head of department, Prof Ros Bramwell (r.bramwell@chester.ac.uk).

Ethical Approval

Ethical approval for the study has been sought and obtained from The Department of Psychology Ethics Committee.

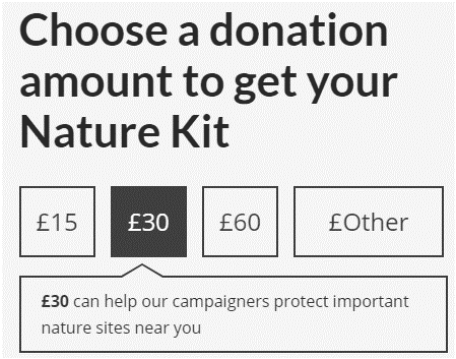
Appendix E – Charity Information

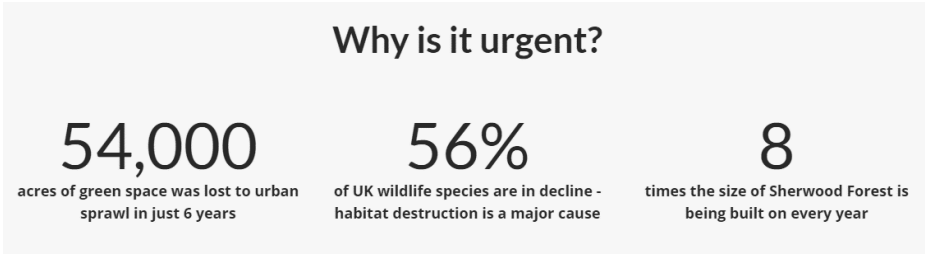
Friends of the Earth

We campaign for solutions to environmental problems.

We're a member of **Friends of the Earth International**, which has groups in more than 75 countries including **Scotland**.

We also have a network of more than 200 **local groups**.





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Greenpeace

Who are we?

The Greenpeace Environmental Trust is a registered charity (284934) and a company limited by guarantee (company number 1636817).

We were founded in 1982 with the objective of "furthering public understanding of and promoting the protection of world ecology and the natural environment". What this means is that we exist to help protect the planet and do so in a number of charitable ways. For more detail please see our Charity Commission page.

How do we work

As a registered charity we spend our funds on work that includes scientific research, education and promoting sustainable development.

As part of the wider Greenpeace movement we share a global vision for a green and peaceful future and our priority concerns include:

- Defending our oceans
- Protecting our ancient forests
- Reducing the effects of climate change, both nationally and globally

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WWF

WWF is the world’s leading independent conservation organisation. Our mission is to create a world where people and wildlife can thrive together.

To achieve our mission, we're finding ways to help transform the future for the world’s wildlife, rivers, forests and seas; pushing for a reduction in carbon emissions that will avoid catastrophic climate change; and pressing for measures to help people live sustainably, within the means of our one planet.

We’re acting now to make this happen.

JOIN US TO CONTINUE OUR WORK

FOR AS LITTLE AS £3 A MONTH

Become a member of WWF and help our vital work to protect some of the world's most vulnerable animals, places and people, tackle climate change and address the unsustainable consumption of precious natural resources. Our work and our many successes are only possible thanks to the generosity of our many supporters. We rely on every single one of you.

Trees for Cities

Trees for Cities is the only charity working on an international scale to create greener cities. Since 1993, we have engaged over 70,000 people to plant over 600,000 urban trees in parks, streets, schools and housing estates across the UK, as well as internationally, revitalising these areas and improving the lives of the people who live in them. We strengthen communities through volunteering opportunities and inspire children to grow and eat good food and to connect with nature.

What we do and why we do it

We focus on planting trees and greening community spaces where the social and environmental impact on local people is greatest. In London this might mean planting trees to clean the air or transforming unused community spaces into vibrant green areas, making our communities happier and healthier places to live, whilst in Nairobi it's planting fruit trees for food and sustainable livelihoods.

Appendix F – Post-Intervention Charity Signup Debrief

1. Script for asking participant to sign up for an environmental charity
    a. ‘Thank you for completing the experiment. As an aside, I have been investigating environmental action as part of my research. I thought I’d give participants the option to sign up to one of these charities. Please take a look at the list and let me know if you would like to fill out their application form, I am not linked to any of these charities and get no incentive from this. If you want to sign up for any of these charities, please let me know now.'

2. Debrief script after sign up option
    a. ‘Thanks for your interest. This final part was actually part of the experiment, and was intended to correlate accuracy of some of the questions provided in the questionnaires, with real life intent to act. If you would still like to sign up for one of these charities, please go to their website where they make it very easy to do so. There is no obligation for you to do so, and I do not need to know whether you have or have not signed up. If you have any questions or concerns, please let me know. The experiment is now over, many thanks for your time.’

Appendix G – Inter-Measure Correlations

Pre-Intervention

		PANAS_Pos_pre	PANAS_Neg_pre	Motives_Ego_pre	Motives_Alt_pre	Motives_Bio_pre	CNS_pre	EAS_pre
PANAS_Pos_pre	Pearson Correlation	1	-.052	.149	-.011	.147	.131	.216
	Sig. (2-tailed)		.730	.323	.940	.330	.386	.150
	N	46	46	46	46	46	46	46
PANAS_Neg_pre	Pearson Correlation	-.052	1	.022	.117	-.045	-.043	-.136
	Sig. (2-tailed)	.730		.883	.438	.769	.776	.367
	N	46	46	46	46	46	46	46
Motives_Ego_pre	Pearson Correlation	.149	.022	1	.284	-.207	.078	-.115
	Sig. (2-tailed)	.323	.883		.056	.167	.605	.445
	N	46	46	46	46	46	46	46
Motives_Alt_pre	Pearson Correlation	-.011	.117	.284	1	.130	.101	.042
	Sig. (2-tailed)	.940	.438	.056		.391	.502	.784
	N	46	46	46	46	46	46	46
Motives_Bio_pre	Pearson Correlation	.147	-.045	-.207	.130	1	.511**	.665**
	Sig. (2-tailed)	.330	.769	.167	.391		.000	.000
	N	46	46	46	46	46	46	46
CNS_pre	Pearson Correlation	.131	-.043	.078	.101	.511**	1	.623**
	Sig. (2-tailed)	.386	.776	.605	.502	.000		.000
	N	46	46	46	46	46	46	46
EAS_pre	Pearson Correlation	.216	-.136	-.115	.042	.665**	.623**	1
	Sig. (2-tailed)	.150	.367	.445	.784	.000	.000	
	N	46	46	46	46	46	46	46

**. Correlation is significant at the 0.01 level (2-tailed).

Post-Intervention

		PANAS_Pos_post	PANAS_Neg_post	Motives_Ego_post	Motives_Alt_post	Motives_Bio_post	CNS_post	EAS_post
PANAS_Pos_post	Pearson Correlation	1	.074	.090	.277	.358*	.350*	.184
	Sig. (2-tailed)		.627	.554	.062	.014	.017	.221
	N	46	46	46	46	46	46	46
PANAS_Neg_post	Pearson Correlation	.074	1	-.012	.057	.281	.458**	.232
	Sig. (2-tailed)	.627		.939	.708	.059	.001	.120
	N	46	46	46	46	46	46	46
Motives_Ego_post	Pearson Correlation	.090	-.012	1	.443**	-.019	.110	-.050
	Sig. (2-tailed)	.554	.939		.002	.900	.468	.740
	N	46	46	46	46	46	46	46
Motives_Alt_post	Pearson Correlation	.277	.057	.443**	1	.180	.110	.070
	Sig. (2-tailed)	.062	.708	.002		.230	.469	.646
	N	46	46	46	46	46	46	46
Motives_Bio_post	Pearson Correlation	.358*	.281	-.019	.180	1	.401**	.647**
	Sig. (2-tailed)	.014	.059	.900	.230		.006	.000
	N	46	46	46	46	46	46	46
CNS_post	Pearson Correlation	.350*	.458**	.110	.110	.401**	1	.431**
	Sig. (2-tailed)	.017	.001	.468	.469	.006		.003
	N	46	46	46	46	46	46	46
EAS_post	Pearson Correlation	.184	.232	-.050	.070	.647**	.431**	1
	Sig. (2-tailed)	.221	.120	.740	.646	.000	.003	
	N	46	46	46	46	46	46	46

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix H – Written Responses from Intervention

Group A – Separate from Nature Perspective

Responses after first video	Responses after second video	Response to charity signup
A from the first moments when life first formed in the oceans.at no point have we become separate from nature.	Expanding population is putting extreme pressure on all other life on earth.the incraseing demand on resourses is causing polution and climate change.	Don't trust how charities spend their donations
Waste dropped in environment.traffic.highly populated inner city.		Global organsation and member of another already
The traffic. the people shopping	Elephant that had been shot.climate change. orrangutans under threat.	Charities aren't so relevant to me. I already donnate to WWF and mainly people charities. Also, don't have much money as a student, would prefer local charity
The population size and rate of population growth among humans differs to that of other creatures on the planet. our impact on the planet is much greater and much more negative thanother living things.	The extinction of many species of animals. the alteration of landscapes. the alteration of the climate leading to further loss of species in the future. all of these things are due to human exploitation of the planet and the organisms living on it.	Interested in affecting policy relating to environment. Really concerned about spiecies extinction due to human activity.
1. when seeeing that the human race had double in space of 40 years less than an average lifspan. 2. towards the end of the clip as it suggetsed that multiple species are being harm due to the human race. 3. how the human race	1. the moment when it was suggetsed that humans have caused the exstinction of multiple species. 2.that our ecosystems have caused theexstinction of a quarter os species. 3.and that climate chance has caused more exstinction.	Have the extinction of animals fresh in mind from videos.

Seeing the garbage in the river.how we have built our own poluting cities	In all the clips i felt that we are damaging the planet.	Would like to do own research, feel a bit sceptical under pressure. Interested to sign up, perhaps for WWF, but need to think about first. Thought the videos brought home the reality of environmental issues.
Rubbish in the water supply, the barren landscape and the vast amount of population growth in the last 40 years all struck me as moments where connection to nature has been lost	The images of lost species, again, physical evidence of pollution and the visual of species we may lose	Local action is a better approach. Feel powerless to make a difference on my own.
Rubbish in the river, big water plantation and people using cars without second thoughts	Dead elephant, rubbish in the river and dead whale	Was interested in WWF and took a photo of the info sheet. Not interested in trees, but found the picture of the dead elephant really sad.
Speed of population growth in the last 40 years. spread of non-decomposible plastic waste.	Video of recently extinct species. statistics on extinction threats. forecasts of loss of biodiversity.	Experiment sharpens the mind onto the topic of the environment. I used to donate to charities but let it slip, so it's a good chance to sign up again, which is something I intend to do again at some point.
View of congested city, full of cars. mass of people on beach, with no apparent connection with their natural surroundings, plastic bottle/rubbish	Elephant poaching was the only image i saw, the rest was in the audio and associations i made with images of animals such as orangutans and what i know about things like palm oil production	Already signed up to many charities. Want to be more effective with the impact I have, so potentially being more selective about which charities I sign up to and also what I do myself to focus on environmental causes. Increasing financial contribution to charities may not make my impact more effective. I want to be better informed about cause and effect and how i can make a difference.

	Floating waste.dead animals.traffic pollution	Already a member of WWF. Don't like the idea of having to give something each month, as it puts pressure on people and can make them feel guilty, especially when people can't afford it. And, does the charity money actually all go to the cause?
Seeing crowds of people in a city.fast moving traffic. people lying on a beach	Seeing the dead elephant. seeing the pictures of extinct animals-dodo and thylacine. hearing the voiceovers saying how many species have become extinct or endangered as a result of humans destroying the earth	Want to sign up but don't have any money to give. Heard something good about their work.
Over population. extinction of animals due to human interaction.	Humans are causing climate change. mass exctinction of several groups of animals	No money and have bigger issues in my mind. Gives to Oxfam which is more about people than animals.
Pollution,increase in population, changes to natural environments	Depleting natural resources such as over fishing, altering environments,	Already give to a number of charities. More interested in small local initiatives. Really really don't like the emails that come from signing up, so even without having to make a donation, I don't want to sign up.
The vast time between 'creation' and today. images of 'modern' city living. rubbish in river	Various statistics about extinsion	Like the idea of getting trees into cities and giving kids the chance to have nature in their urban environment. Don't like th aggressive nature of Greenpeace, not interested in Friends of the Earth Lobbyist approach. The questions in the experiment of 'do you feel linked to nature?' made me think of when I grew up and had lots of green space, which moves me towards the trees for cities.

seeing all the traffic and it mentioning the landscape change and how it has affected the pressure on natural lifeforms	We have put presure on all lifeforms by risking extinction. especially in reptiles amphibians and mammals. as well as effects on the general ecosystem.	Already a member of WWF and like to think about things before I sign up to them. There are so many charities out there, and lots of good causes. Important to support evenly across charities and causes like cancer vs the environment.
With the growing population.seeing rubbish and seeing major roads and bulidng taking over landscapes	The loss of species.the destruction of habitats, the endangering of current species	Don't sign up for stuff in the moment, want to research stuff. The charities are good causes but want to be well informed.
Roads/ infrastructure- use of man-made materials. delay in time from where humans came about compared to plants, animals.pollution from cars/ traffic.	Extinction of animals. climate change. use of land causing inhabitation/ deplantation..	Think friends of the earth actively look for solutions and the cities need more trees, so sign me up!!
The first clip of humans in an urban environment. when the narrator described the massive increase in human population. the clip of rubbish floating on water. the clip of the dam.	Every separate description of the numbers of animals made extinct. the point about the 1000x increase in extinction rates compared to the fossil record.	I don't sign up to any charities, not in the habit of doing that. Would have to be something that I'd considered in a lot of detail first.
Mentioning population growth, the scene shows only roads and crowds. the natural environment is completely replaced.. showing plastic waste floating in a river. humans have disgarded it with no thought for where it will end up.	Huge increase in the extinction rate. over fishing, knowlegde of fish stocks and seemingly no action to prevent that.	Interested in a mailing list, but don't want to sign up to an ongoing direct debit, and want to be sure that the money goes to the cause that really needs it.
Cars on the road, rubbish in the water and facts about humanschanging the world in the 50 years or so.	The extinction ofanimals,fish, insects, etc.	Don't feel like I've got enough money. Feels like high pressure situation, and charities have a bad image because of being bombarded by the people in the street asking me to sign up.

Busy cities filled with traffic.a dam created by man but impacting nature. the l.obvious lack of diversity in the ocean	A quarter of all life will be lost this century. 25 percent of mammals lost. 15 percent of bird population.	I am super dissapointed by environmental charities. They need to realise that the biggest threat to the environmental is mass agriculture, and until that happens everything else is missing the point.

Group B – Connected to Nature Perspective

Responses after first video	Responses after second video	Response to charity signup
In this particular video, i didn't feel many connections between humans and nature. it didn't portray humans, perhaps fairly, as being in harmony with nature. i clicked the spacebar when people appeared but only because i felt i should	Mostly when it explicitly told me that x animal was extinct, that's when i clicked. also, if it showed a dead animal, like the elephant.	Don't want to be on mailing list / big brother
When the clip moved onto the introduction of human life on the planet,where the clip noted how humans had pushed science and moveed the world forward in such a short period of time in contrast to the amount of time the earth has been here.	The various mentions of animals becomming extinct.the mentions of the issues climate change is causing.	Need to do more research about what charities actually do
The view of earth from space, people walking around the crowded city and the rubbish - it's our responsibility to clean it up for ourselves and fellow planet dwellers	When the cute animals appeared, the fish stocks and the beginning, when they first began to talk about extinction.	No time or money
Seeing the sun peer out over the globe is always an amazing moment that makes me feel connected with the planet.	Seeing old bottles on the beach annoys me. littering. all the stats about the animals that are now threatened with extinction. seeing the dead elephant, likely killed for the ivory. really makes you think that humans actually really are selfish creatures.	Doesn't like to be put on the spot, and already gives to a (non environmental) charity. Considers himself to be selfish.
The moment where it explained how life first began. also the field full of flowers.	When it ststed that entire lineages have been ended.also whenit expalins that a quarter of animal life is expected to be wiped out.	More interested in animals than other issues

When the fish moved onto land. when i saw the birds flying amongst the trees. when i saw the polloution in the river.	After i saw the elephant lying dead on the floor, i was so moved emotionally that i forgot to click the space bar for the majority of the clip. i struggled to pay attention to the remainder of the clip as i considered my own values, and how though i have a love for animals i am not a vegatarian/ do not do anything to contribute to saving the planet.	Even though I feel sad, and guilty, I'm not motivated to help
Underwater with coral and fish. time lapse urban scenes. ants crawling up the leaf.	Bottles washing up on rivers edge.dead elephant. text on species extinction	Doesn't like to be put on the spot to sign up or feel forced. Also, prefers to pick a specific charity and focus on that over a long term.
Beautiful scenes of nature such as the one with jelly fish or the one with the field of flowers.	1. animal in captivity, think it was a tasmanian tiger. 2.dead elephant 3.trash in nature.	Found the videos increased a sense of powerlessness and want's to look at what I can do myself in my home etc.
	Graphic photo of dead elephant. extintions of species facts	Not appealing to sign up, no money. Not willing to make sacrifices to change anything.
The point that you see the first recognisable human arrive and when you realise how many humans there now are on earth	Plastic bottle image, dead elephant and other dead animal in wasteland	Doesn't want any more spam emails. (Said she didn't take much care in responding to questions about how she felt...)
the mention of the development of mammal,the mention of cells dividing to create life, scenes showing the way humans are taking over the earth at the expense of nature	In the mentions of extinction i felth this particularly when the fish and reptile losses were mentioned, when isaw the baby primate, and when i saw the ded elephant	Already support RSPB. Feeling sympathy and pity for the animals when saw dead elephant and other baby animals. Feels that we are spoiling and destroying the environment.
Water, furns and people drawn on the wall	Plastic, water polution and hunting	Already run a charity focused on young people and the environment. Also, feel a little like we are 'pissing in the wind' even though it's important work and that humans are 'just so bad'.

When humans first appeared, when it was made clear that humans were over populating the earth, when it was made clear that humans were harming the earth	The initial set of percentages for species loss, the final percentage in relation to over fishing, the underlining of the rate at which extinction has increased	Already give enough in terms of what I'm comfortable with at the moment. Already give to RSPB and really like they way they actively work rather than putting money in the bank. Knows that money can be wasted, thrown about and high salaries.
When seeing the sun crest over the planet, seeing the fish and insects	The bottle and rubish on the beach, seeing the dead animals in the dessert and the stats given	Want to stay up to date on the reality of the situation, don't mind getting emails. Don't trust the news, so looking for an alternative source and also for information that may spark my interest.
during clips of the road, during clips of the plants and insects and clips of the sea	Animal extinction due to the enviroment changing, animal extinction due to climate change and litter which damages the enviroment	Don't want to do anything regular, but want to make a one off donnation. Grew up around animals and love to support them.
When seeing the timelapse clips of humans in transit... when seeing the birds flying in the jungle	When i saw the bottles being washed upon the beach	Don't have enough information about environmental issues, also sceptical about what charities do and how they spend their money. Further, I question whether humans are intelligent enough to counteract our natural destructive tendencies, so perhaps it is just enevitable that we will danamge the environment while perhaps destroying our own species and other speicies in the process.

The clips which focused on marine life. when i saw clips which showed the earth as a whole as it reminds me of how inferior the human race is to the rest of nature.	Throughout the whole clip i felt the damage we are doing. the clips on marine life for me perosnally was particularly shocking. to hear how we are slowly damaging all species e.g. reptiles. the clip about how in s many years we will have killed off so many ore animals highlights how much damage we are doing.	Don't like to be pressured, but do feel guilty and shamful about what we have done and it worries me about what we will do in the future to the environment.
Several moments that showed the huge variety and numerousness of nature - shoals of fish, fields of plants, just like our crowds of people. seeing the skull of an ancestral hominid species was a reminder too that we are not so separate from the rest of the animal kingdom. the image of the volcano was a good reminder of how close we live to nature and its influence also.	The solitary fish apart from the shoal, appearing to struggle. the elephant that had been killed somehow,and the young rhino - something that future generations risk never being able to see	We always get animals shoved down our throat, so it's nice to do something different to support the environment. Such an esy ask to plant a tree and we need more of it! Obvious by less thought about approach to doing something for the environment.
the first clip that showed people in the foreground and yet it still had the same sky shared with all the animals and plants that we inhabit this planet with.	First scene showed a plastic bottle lying on the shoreline. i also think it's sad to hear that we are exploiting our environment so much as emphasised by the clip describing how much we overfish.	Don't know enough about each charity, would need to experience the work they are doing first hand. Generally don't donate to charities because I'm sceptical about them.
When i saw people do drawings in the cave	When i saw the plastic bottles in the sea	Want to find out more in my own time, thinking about joining Friends of the Earth anyway. Want to have done quite a lot of research. Don't like on the spot sign ups, and there isn't enough information available. Also want to get involved directly rather than donating as it feels disconnected just donating.

Overview of earth at intro.cave drawings	Bottles in the ocean, hunted elephant	Charities waste a lot of their money through burocracy and they are generally not very effective. Charities are weak compared to the large corporations. Proper activism, either individuals, groups or organisations is needed - direct action against those polluting etc. is needed.
After humankind appeared and before it got way too numerous.	Climate change, extinction of species, destruction of whole ecosystems.	I don't believe in the charity organisations but I do believe in the causes. I believe that the charities don't actually address the real causes but they invest in solutions that don't really work. It's the big industry of meat that needs to be addressed, but the charities are not taking on the real culprits - the big companies with big money interests.